pp. 83–156] [February, 1944

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MAIN CONTENTS :

	PAGES
Summary of Recent Abstracts II.—Yellow Fever	83–88
Malaria	88–105
Blackwater Fever	105–106
Trypanosomiasis	106–109
Leishmaniasis...	109–110
Fevers of the Typhus Group...	111–121
Yellow Fever	121–126
Sandfly Fever...	126–129
Plague...	129–130
Cholera	130
Bacillary Dysentery	131
Amoebiasis	132–134
Relapsing Fever and other Spirochaetoses	134–135
Leprosy	135–137
Helminthiasis...	137–142
Deficiency Diseases	142–143
Haematology	143–146
Miscellaneous...	147–154
Book Review	155–156

For detailed Contents see pp. ii, iv, vi and vii.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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SUMMARY OF RECENT ABSTRACTS.*

II. YELLOW FEVER.

General.

SOPER (p. 536) gives a concise and lucid account of yellow fever in the Americas during the years 1938 to 1942. Briefly, the points are as follows :—(1) Epidemics transmitted by *Aëdes aegypti*, and originating from other outbreaks transmitted by the same mosquito, have not been observed since 1934. (2) Only one outbreak transmitted by *Aëdes aegypti*, but originating from jungle yellow fever, has been discovered. (3) Jungle yellow fever has occurred in Brazil, Bolivia, Peru, Colombia and Venezuela. (4) In some forested regions it is apparently possible for jungle yellow fever to be maintained permanently on a mosquito-animal-mosquito basis [that is, man is not a necessary factor]. (5) The Yellow Fever Service of Brazil aims at the complete eradication of *Aëdes aegypti* from the country, and this has already been achieved in seven States. [This is a large conception. Species eradication was the aim of the authorities in the recent campaign against *Anopheles gambiae* in Brazil, and the yellow fever organization played a great part in carrying out successfully what appeared to be a most ambitious programme. The results already achieved against *Aëdes aegypti* give a hope of success in an even wider field. How far the principle of species eradication can be applied in other branches of tropical hygiene remains to be seen, but it is a stimulating aim which should not lightly be dismissed as impracticable.] (6) The vaccination programme has been satisfactory, with the exception of the events which are recorded below in this Summary. Recommendations made are that anti-larval campaigns should be organized on a permanent basis, that the viscerotomy and vaccination services be extended to all regions of jungle yellow fever and the latter to all aircraft services.

Epidemiology.

SMITH and HOWIE (p. 303) examined the sera of 100 natives of Ibadan, Nigeria, and found that 11 gave fully, and 9 partially, positive mouse protection tests ; these persons were aged $5\frac{1}{2}$ to $11\frac{1}{2}$ years.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1943, v. 40. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

The results may be compared with the 42 per cent. positive found by Beeuwkes and Mahaffy in the same place, in children up to 14, in 1934. In some of the positive children there was a history suggesting an attack of yellow fever. In the present series four mice were used for each test, and survival of three or four was considered as evidence of complete protection; in the earlier series six mice were used and survival of five or six was regarded as evidence of protection.

CECCALDI (p. 907) reports that during 1941 the diagnosis of yellow fever was made, from examination of post-mortem specimens, in six persons from Gabon and the French Cameroons.

CORADA REDONDO (p. 603) reports six cases of what is claimed to be yellow fever in Europeans in Kogo, Spanish Guinea. Of 25 sera from persons of this area, eight were found to give positive mouse protection tests [but in the absence of details of the persons concerned the significance of this result cannot be assessed].

The grivet monkey (*Cercopithecus aethiops centralis*) is one of the most ubiquitous mammals in the East African yellow fever zone, and is migratory. HUGHES (p. 771) has shown that in certain individuals of this species circulating yellow fever virus may be found in high concentration after injection of the virus or after transmission by the bite of infected Aëdes mosquitoes, but that there is marked variation in susceptibility and in virus titre. It seems probable that this animal may be implicated in the spread of yellow fever to man.

[It has been pointed out that in the Summary of Recent Abstracts on Yellow Fever (this *Bulletin*, 1943, v. 40, 97) an incorrect reading of Findlay's view of the maintenance of rural yellow fever in West Africa has been given. Findlay (1941) stated that although *at present* the only two definite factors known to be concerned in spread are the infected mosquito and the infected human being, before it is possible to give an answer to the question whether animals (bats, squirrels and other small rodents) play any rôle in maintaining endemic yellow fever it will be necessary to examine some hundreds of specimens, instead of, at the time he wrote, just under 50.

The comment on Findlay's paper, therefore, does not apply, and there is no antithesis between his views and those of the Rockefeller workers.]

LAEMMERT (p. 694) has failed to find evidence that the yellow fever virus can multiply when injected into certain South American poikilothermal animals; the animals included iguanas, lizards, tortoises, boas, toads and frogs.

During the last epidemic of yellow fever in Mexico, which occurred in 1919–23, the incidence in certain areas was sporadic, and BUSTAMANTE (p. 388) was therefore led to think it probable that the jungle form existed in these places. Sera collected in the valley of the Rio Usumacinta, Yucatán, were sent for examination by the mouse protection test. This area appeared to offer favourable conditions for the occurrence of jungle yellow fever, but no protective bodies were found in persons under 29 years of age, and BUSTAMANTE *et al.* (p. 453) consider that these results indicate that yellow fever has not been present for many years. The last clinical case reported in Mexico was in 1923.

Transmission.

LEWIS (p. 602) considers that *Aëdes aegypti* was probably of little importance in the transmission of yellow fever during the epidemic of

1940 in the Nuba mountains of the Sudan, except in certain villages. He gives a list of seven species of mosquitoes, known to be potential vectors and found in the area. Of these *Aëdes vittatus* is probably very important; *Aëdes taylori* important; *Aëdes luteocephalus*, *Aëdes metallicus* and *Aëdes aegypti* of some importance in the hills or in certain villages; and *Aëdes simpsoni* var. *lilii* and *Taeniorhynchus africanus* of little or no importance. *Aëdes furcifer*, although not a proved potential vector, is regarded as probably an important transmitter.

Aëdes simpsoni is a natural vector of yellow fever in Uganda. GIBBINS (p. 304) reports that its principal breeding places are in the axils of various water-holding plants:—a variety of plantain, an Aroid (Colocasia) and the pineapple. Breeding also takes place occasionally in tree holes. The mosquito never enters buildings; it bites by day, and is common in native gardens.

HARRIS (p. 39) has found that the commonest species found breeding in domestic water containers in Dar es Salaam, Tanganyika Territory, is *Aëdes aegypti*; it also breeds in tree holes, but here *Aëdes simpsoni* and *Aëdes metallicus* are more frequently found than in domestic water.

ANDUZE (p. 537) has investigated the geographical distribution of species of Haemagogus in Venezuela.

DUNNAHOO (p. 908), discussing insect control in aircraft, notes that disinfestation stations have been established in Trinidad, Venezuela and Colombia, and inspection stations in Porto Rico, Haiti and Jamaica, to cover all air routes from South America to the United States, and that Pan American Airways require all aircraft to be disinfested between all ports. He describes the method of using 2 per cent. pyrethrin preparations, projected from a sprayer.

Aetiology.

VAN DEN BERGHE (p. 40) reports the sudden production, by the neurotropic French strain of yellow fever virus, of symptoms characteristic of viscerotropic strains, after intracerebral inoculation into a baboon. Subcutaneous injection of liver emulsion from this baboon into rhesus monkeys reproduced the viscerotropic type of disease, but intracerebral inoculation of brain material into mice gave results similar to those produced by neurotropic strains. This course of events is regarded as possible in man after inoculation of Laigret's vaccine. The author does not look on it as a true mutation, but rather as a demonstration of the fact that the virus is pantropic and that after repeated brain passages the neurotropic elements have become predominant. The preponderance of neurotropic or viscerotropic particles is apparently influenced by the tissue environment, brain and liver respectively.

[For a sudden change towards neurotropism in the attenuated strain 17 D, see FOX *et al.* below.]

FOX (p. 772) has found that animals which have survived cerebral infection with yellow fever virus are very much more resistant to highly neurotropic strains than animals immunized against ordinary systemic infection, and that this difference is not related to the levels of protective antibodies in the sera. There is, however, a possibly significant relation between resistance to neural infection and the antibody content of the brain; it seems that there is a local specific mechanism based, at least in part, on the concentration of antibody in the cerebral tissue.

Fox (p. 772) has shown that in mice inoculated intracerebrally with the attenuated virus 17 D there may occur specific but non-fatal infections, with immunity against reinfection by the same route. Small initial doses produce more of these non-fatal infections than higher doses, and different strains of 17 D differ greatly in their effect. The French neurotropic strain and the pantropic Asibi strain produce this effect only occasionally, but strains isolated from patients with jungle yellow fever in Brazil produced these non-fatal infections with some frequency. It is therefore evident that with these jungle strains the demonstration of these non-fatal infections is essential in measuring the infectivity of virus preparations.

Penna and Bittencourt (p. 840) have identified virus in the brains of three monkeys which died of generalized tuberculosis 63, 93 and 159 days after intracerebral inoculation with virus 17 D. No such persistence of the virus was found in seven others similarly inoculated and subsequently killed. It is suggested that the tuberculous process may have had some effect in unmasking a latent virus.

Vaccination.

Hargett *et al.* (p. 692) describe in detail the method, adopted by the United States Public Health Service, of preparing yellow fever vaccine from strain 17 D without the use of human serum. Fertile hen's eggs are inoculated with 17 D virus of 227th–230th passage ; egg passage virus, rather than virus propagated in tissue culture, is preferred. After incubation the embryo is triturated in water and centrifuged. The supernatant liquid is tested for sterility and virus content, and is frozen ; if the tests are satisfactory it is dried and kept at temperatures of −16° to −30°C. For use the vaccine is rehydrated and diluted with saline, and is injected within one hour of rehydration. Certain requirements must be complied with :—Sterility must be absolute ; guinea-pigs inoculated intraperitoneally must not show illness ; there must be at least 66,000 minimum lethal mouse doses per millilitre ; a monkey inoculated intracerebrally must show circulating virus and a positive mouse protection test (having previously been negative), and must recover, without developing paralysis, from any illness incurred.

Fox and Cabral (p. 451) have examined the sera of 926 persons at various intervals after vaccination, each with one of four sub-strains of the attenuated virus 17 D. Three of the sub-strains had been passaged 220–255 times in tissue culture (these are referred to as low passage) ; the other (referred to as high passage) had been passaged 315–385 times when used for preparation of vaccine. It was a condition of the test that serum taken soon after vaccination should have been kept in sealed ampoules until the later examinations, and it was shown that serum kept in this way suffered, over a period of nine months, no significant deterioration in antibody content compared with the same serum kept in desiccated form ; it is known that desiccation is effective in maintaining a high antibody titre over a considerable period. In the tests, mice aged 17 to 21 days were used, since it was known that young mice are much more susceptible to intraperitoneal doses of neurotropic yellow fever virus than are old mice [see Theiler and Bugher ; Whitman, below].

The results showed that, in vaccinated adults who were non-immune before vaccination, the immune state produced persists satisfactorily for at least four years, from the point of view of the group of

individuals. But the high sub-strain of virus had lost some of its antigenicity and the results obtained with vaccine prepared from it were not so satisfactory. Moreover, low immune levels, both early and late, were the rule in subjects under 10 years of age at the time of vaccination; age, therefore, seems to be important in determining the immune response and the duration of immunity after vaccination.

In some sera in which no antibodies could be detected by routine tests, a more sensitive technique revealed their presence, but the evidence suggests that immunity induced by the 17 D virus may completely disappear in at least some cases.

Fox *et al.* (p. 44) report the occurrence of signs of encephalitis in persons vaccinated against yellow fever with preparations of the attenuated virus 17 D. This complication appeared somewhat suddenly in 1941, and, in the most heavily affected area, was found in 0·5 per cent. of 55,073 persons vaccinated. Mild reactions, usually evident six to eight days after vaccination, had previously not been uncommon, but the severe reactions now reported, with encephalitis, developing 10 to 21 days after vaccination, appear to be new for this vaccine; one case was fatal. The vaccine itself was responsible, and the evidence pointed to a sudden alteration in the character of the virus in a small number of subcultures away from the parent strain. The authors have now changed their technique so that all vaccine is now initiated from primary and secondary batches of known character and adequate size.

In the *Journal of the American Medical Association* (p. 40) there is an account of the outbreak of jaundice in American troops inoculated with yellow fever vaccine. It is evident that this, like other similar outbreaks, is not a form of infection with the yellow fever virus, and the assumption is that the human serum used at that time in the preparation of the vaccine was the agent responsible for the jaundice; whether because it contained a virus, or by some other process, is not here determined. Since this outbreak the human serum component has been left out of the vaccine, and it is believed that the risk of jaundice has been eliminated.

Fox *et al.* (p. 41) give a full account of outbreaks of jaundice which have occurred in the large groups of people inoculated, in South America, with yellow fever vaccine prepared with human serum. They have now eliminated the serum and since that was done no case has been found in 164,000 persons inoculated. The authors have not been able to transmit the affection to animals, and it is not yet clear if the disease is due to a virus or to some other process connected with the serum, but most of the evidence indicates that the serum contained the exciting agent. Certain batches of serum only were incriminated; it is evident that not all sera can produce the disease.

Findlay (p. 389) notes that attempts to produce immunity to yellow fever by means of virus inactivated by heat, ultra-violet light, or formaldehyde, have not been successful. He has investigated the effect of 37 soaps, fatty acids, and other surface-acting agents, to see if they would inactivate the virus while permitting it to retain its antigenic properties. Many of the substances were capable of inactivating the virus, and six showed the desired effect of inactivation with retention of some degree of antigenicity; these were acetyl-salicylic acid, linoleic, linolenic, maleic and mucic acids, and "tetralene."

Theiler and Bugher have each shown that baby mice are much more susceptible than adult mice to extraneural injection of yellow

fever virus. WHITMAN (p. 534) has used this fact to institute a more satisfactory mouse protection test. With mice aged 18–21 days, the results of injection of 0·06 cc. of a mixture of two parts immune serum and one part virus suspension are equivalent to those of injection of 0·6 cc. into adult mice which have received intracerebral starch. The volume of serum can be increased and the amount of virus maintained constant, and in this way very small amounts of antibody can be detected ; the test will therefore be useful for the sera of animals and of man after vaccination, in which antibody levels may be extremely low. A disadvantage is that only mice of uniform and exactly known age can be used, and therefore only those laboratories in which breeding is carried out can carry out the test. *Charles Wilcocks.*

MALARIA.

YAO, Y. T. **Present Status of Malaria in Free China.** *Chinese Med. J.* Washington. 1943, Jan.–Mar., v. 61, No. 1, 38–46.

Numerous epidemics of malaria in China have occurred since the outbreak of the Sino-Japanese war. In the autumn of 1938 an epidemic of *P. vivax* malaria occurred in Chenchow, Honan, among refugees, following the breaching of the bank of the Yellow River to stop the Japanese advance ; the disease was mild in type. At the same time some 60 per cent. of Chinese soldiers fighting in the east of Hupeh contracted malaria. In the same year subtertian malaria much hampered the construction of the Yungfu-Lutsai section of the Heng-yang-Liuchow Railway. In 1939 thousands of workmen on the Lung-ling-Wanting section of the Yunnan-Burma highway died of subtertian malaria. From 1938 to 1940 severe annual epidemics of malaria afflicted the districts on the Hunan-Kweichow border. Banditry and rinderpest among the cattle impoverished the population and lowered its resistance. In Chungking malaria became epidemic in 1939 and each autumn has seen a recurrent epidemic in the outskirts of that city ; 85 per cent. of cases are *P. vivax* infections.

In the flat low-lying regions of China malaria is mild and predominantly *P. vivax* in type. In the south-western provinces of Free China malaria is hyperendemic, especially along the borders of Indo-china, Thailand and Burma. Here *P. falciparum* infections predominate.

Twenty-five species and six varieties of Anopheles have been reported from Free China ; these are listed ; the list includes 20 of the 21 species identified by SWEET *et al.* [this *Bulletin*, 1943, v. 40, 666] and also the following :—*aitkeni* var. *bengalensis*, *annularis* var. *adiei*, *gigas*, var. *simlensis*, *jamesi*, *jeyporiensis*, *karwari*, *majidi*, *pattoni*, *philippinensis*, *sacharovi* and *stephensi*. In south-western China *A. minimus* is the chief vector of malaria. The number of dissections of this species in this part of China that have been reported in the literature is 23,820. Infection rates have varied from 0 to 30 per cent., average 5·5. *A. jeyporiensis* var. *candidiensis* comes second in importance as a vector ; infection rates of 8·0 and 0·2 per cent. have been reported. *A. hyrcanus* var. *sinensis* is found all over China from Manchuria to Hainan Island, and from the east of Shanghai to the west of Szechuan. Infection rates varying from 0 to 7 per cent. have been

reported, average 0·3. Other species have been dissected in insufficient numbers to determine their importance as vectors. The present anti-malaria organizations in Free China are briefly described. [See also FENG, L. C., this *Bulletin*, 1937, v. 34, 942; ROBERTSON, *ibid.*, 1941, v. 38, 501; WILLIAMS, *ibid.*, 1941, v. 38, 502.] *Norman White.*

YU, N. G. & YING, Y. Y. **Notes on Subtertian Malaria in Yunnan.** *Chinese Med. J.* Washington. 1943, Jan.–Mar., v. 61, No. 1, 17–30. [16 refs.]

Subtertian malaria is severely endemic in Yunnan, notably in the valleys of the Yuan Kiang, Paipi Kiang and Lan-tzang Kiang. There has been a very large influx of people from all parts of China since the opening of the Yunnan-Burma highway. This paper is based on a study of 107 cases hospitalized in Kunming. Only 13 of these patients were natives of Yunnan Province. All but two were males, 91 being in the 20 to 39 age groups. There was a sudden rise in subtertian malaria incidence in June, which reached its maximum in July and remained high in August and September. The incidence declined sharply in October. The authors analyse the symptoms and signs of their 107 cases and describe the laboratory findings. A great many of the protean manifestations of this disease were represented. There were 33 patients suffering from pernicious forms of the disease; 10 of these were hyperpyrexial, nine bilious-remittent and six comatose. Three of the comatose patients died as did one with the "cardiac" form. In obscure cases sternal puncture and the ephedrine provocative test were found useful. *Norman White.*

DAS, B. K. **Malaria at Chandpur (Bengal).** *Indian Med. Gaz.* 1943, July, v. 78, No. 7, 327–30, 1 chart.

Chandpur is an important railway and steamer station in the Tipperah District, East Bengal. It is the railway junction of lines going to Calcutta, Chittagong and the Surma Valley, Assam. The railway depot, at some distance from the town, contains a small labour colony (population not stated) where the author made a five-day survey at the end of October 1942 to determine the causes of a severe outbreak of malaria. Chandpur is normally a healthy station with low malaria endemicity, but in 1941 the monsoon rainfall was excessive and was productive of more persistent mosquito breeding than usual. This coincided with the arrival of large numbers of evacuees from Burma, many of whom passed a night or two in Chandpur; many of them had been suffering from fever. In July 1942 there was an abnormal prevalence of malaria; sufferers from this disease attending the railway and labour camp dispensaries up to October were about twice as numerous as the average annual attendances of the two previous years. Random samples of blood were examined; parasites were found in 22 out of 37, *P. falciparum* in 17, *P. vivax* in 4, both species in 1. Crescents were found in 13. Five species of Anopheles were found breeding in tanks and borrowpits: *A. aconitus*, *A. annularis*, *A. vagus*, *A. pallidus* and *A. hyrcanus*; adults of the first three were taken in houses. Two of 24 *A. aconitus* dissected were infected; none of 66 *A. annularis* was infected. *A. philippinensis*, an important vector in this part of Bengal, was not found. Hitherto *A. aconitus* has not been considered a vector of importance in this part of India.

Norman White.

WILSON, D. Bagster & NOTLEY, F. B. **Malaria in Southern Somalia (Italian Somaliland).** *East African Med. J.* 1943, Aug., v. 20, No. 8, 255–62, 1 map.

This is the first British report that has been published about malaria in what was Italian Somaliland. Italian reports on the subject were not numerous [this *Bulletin*, 1939, v. 36, 678; 1938, v. 35, 23 and 509; 1937, v. 34, 374].

The northern part of the country between 5° and 12° N. is semi-desert, with a few small ports, little agriculture, no permanent surface water, and practically no malaria. The southern part between 1° S. and 5° N. contains the two main ports, Kismayu and Mogadishu, and two rivers, Juba and Webbe Shebeli. Over the whole of this southern part there is a patchy distribution of malaria transmitted by *A. gambiae*, which breeds either in irrigation water, flood water from rivers, rain-water accumulations over large areas, localized rainpans or in pools in permanent or seasonal rivers. The malaria transmission season is short almost everywhere and the disease mostly epidemic in type. The riverain areas have a Bantu population with large admixture of Somalis; they have considerable immunity to malaria but insufficient to prevent epidemic manifestations. Spleen rates observed were of three types; higher spleen rates in older than in younger age groups in places with a very brief or intermittent malaria season; a similar spleen rate at all ages with increasing enlargement with age in places with an annual epidemic of a few weeks' duration; spleen rates the same or decreasing with age with spleens of similar size at all ages, indicative of a considerable annual period of transmission which is epidemic at its peak. Examples of the last were found in the Bantu village of Barire and in the mixed Bantu and Somali population of Villaglio; both places are on the Webbe Shebeli. *Norman White.*

SCHWETZ, J. Recherches sur la limite altimétrique du paludisme dans le Congo Oriental et sur la cause de cette limite. [**Research on the Altitude Limit of Malaria in the Eastern Congo and the Causes of this Limit.**] *Ann. Soc. Belge de Méd. Trop.* 1942, Sept. 30, v. 22, No. 3, 183–208.

Malaria is prevalent throughout the African Continent with the exception of certain mountainous regions and of southern parts of South Africa. The author seeks to give greater precision to that statement, to fix the limit of altitude above which endemic malaria does not occur in the eastern Congo, and to determine the cause or causes of such limitation. Published reports regarding the absence of malaria at high altitudes in Kenya, Uganda, Eritrea and Abyssinia are analysed. The author began to study the question in 1933 when the examination of a number of communities between Lake Kivu and Haut-Ituri showed that altitude played no part in the incidence of malaria up to 1,400 metres; that rare cases of malaria infection observed at 1,800 metres were more than probably contracted in neighbouring valleys, and that there was no malaria at altitudes of 2,000 metres. In 1939 many thousands of natives were examined, living in numerous places at altitudes varying from 620 to 2,200 metres between Lake Kivu and Lake Albert. On the high plateaux to the west and south-west of Lake Kivu are four large communities separated by some 20 kilometres the one from the others—Nyangezi, 1,650 metres; Walungu,

1,750 metres; Kabare, 1,950 metres; and Kadjedje, 2,150 metres. Blood examinations gave the following results: Nyangezi, 12 of 55 adults and 38 of 83 children infected; Walungu, 10 of 63 adults and 6 of 103 children infected; Kabare, 2 of 74 adults and 3 of 80 children infected; Kadjedje, no infection found in 30 adults and 56 children. There is a certain migration between the villages and it is almost certain that the few infections in Kabare and even in Walungu were contracted elsewhere. The low infection rates of children support this view. Thus the limit of endemic malaria in Equatorial Africa may be fixed at 1,750 metres. *A. gambiae* is not found above that height; *A. chrysti* is not found below it, with rare exceptions. *A. chrysti* has not been incriminated as a vector of malaria. The absence of malaria at high altitudes seems to be due to the absence of an effective vector rather than to the influence of cold impeding the development of the malaria parasite in the mosquito, though this might be a factor of importance in certain places. *Norman White.*

FAUST, E. C. **Malaria Mortality and Morbidity in the United States for the Year 1941.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 1, 39–46, 2 figs. [14 refs.]

The steady decline in malaria mortality in the United States continued in 1941, during which year 1,390 deaths were ascribed to this disease. Of these deaths 1,113 (80 per cent.) were reported from the 14 malarious Southern States which contain but 30 per cent. of the total population. This figure represents a malaria mortality rate of 2·73 per 100,000 for the Southern States as compared with rates of 3·4, 4·5 and 5·8 for the previous three years. In all the Southern States except Oklahoma the 1941 malaria mortality rates were the lowest on record; the Oklahoma rate was only 2·2 per 100,000. The highest State malaria mortality rates were: Arkansas 8·4; Mississippi 6·7; S. Carolina 6·6; Florida 4·4; Alabama 4·2; and Louisiana 3·0, per 100,000. All the figures in the report refer to the civil population only; the army figures of both morbidity and mortality are considerably lower. [For malaria mortality in 1940 see this *Bulletin*, 1943, v. 40, 664.] *Norman White.*

BENNETT, A. W. **Malaria Endemic in Iowa.** Reprinted from *J. Iowa State Med. Soc.* 1943, Aug., 10 pp.

ZOZAYA, C. Paludismo y arrozales. [**Malaria and Rice Fields.**] *Rev. Facul. de Méd.* Bogotá. 1943, Feb., v. 11, No. 8, 448–76.

LOZNER, E. L. & NEWHOUSER, L. R. **Studies on the Transmissibility of Malaria by Plasma Transfusions.** *Amer. J. Med. Sci.* 1943, Aug., v. 206, No. 2, 141–6. [15 refs.]

These studies were designed to determine the likelihood of transmitting malaria by plasma transfusions, a matter of topical interest and importance at the present time. The donors and the 35 recipients were all patients in a hospital. The donors were undergoing malaria therapy with either *P. malariae* or *P. falciparum*. The recipients were also patients with central nervous system disease in whom malaria therapy was either indicated or not contraindicated. From each donor 250 ml. of blood were drawn into 35 ml. of 2·5 per cent. sodium

citrate. The mixture was centrifuged the same day (2,500 r.p.m. for 1 hour) and stored overnight at 8°C. On the following morning the plasma was aspirated without filtration. In 20 instances the plasma was frozen immediately after aspiration and then stored at —20°C. In 3 of the observations the plasma was dried from the frozen state. In 12 cases plasma was preserved at room temperature (20–25°C.) in the liquid state for 1–14 days before administration. The dosage of plasma varied from 60 to 270 ml. It was given intravenously by a standard set in which was incorporated a glass tape filter (equivalent to a 150-mesh stainless steel filter) for removal of fibrin shreds. The only certain transmissions of malaria in the whole series were in the cases of two patients who received plasma preserved in the liquid state for only one day. There was also a very doubtful case among the five patients who received plasma that had been kept in the liquid state for one week before injection. None of the five administrations of plasma that had been kept two weeks in the liquid state transmitted malaria. "The likelihood of the transmission of malaria by any plasma programme, regardless of type of preservation used, is practically non-existent." *Norman White.*

DAS GUPTA, C. R. **Transmission of Malaria through Transfusion of Blood.** *Indian Med. Gaz.* 1943, Aug., v. 78, No. 8, 384–7.

A patient suffering from myeloid leukaemia received a fourth transfusion of fresh citrated blood. Five days later the patient developed high fever with a rigor. Blood examination revealed a heavy infection with *P. falciparum.* The donor, an apparently healthy male with no history of previous malaria, had returned to Calcutta from a holiday just previous to being bled. The day following the bleeding he had an attack of fever due to *P. falciparum.* He had evidently been in the incubation period of infection when bled. The author suggests that when blood transfusions are given in circumstances in which it is impossible to eliminate the risk of malaria infection, the adult patient so treated should be given five grains of quinine thrice daily for three days [see also this *Bulletin*, 1941, v. 38, 505].

Norman White.

BOYD, M. F. & RUSSELL, J. C. **Preliminary Observations on the Inheritance of Susceptibility to Malaria Infection as a Character of** *Anopheles quadrimaculatus*, **Say.** *Amer. J. Trop. Med.* 1943, July, v. 23, No. 4, 451–7, 1 fig.

If a batch of female *Anopheles quadrimaculatus* are fed on a man whose blood contains the infecting stage of *Plasmodium vivax*, it is commonly observed that some mosquitoes do not become infected: moreover the number of sporocysts developing in the infected individuals varies greatly. There is evidence that infections of certain Culicines by avian malaria parasites is influenced by genetic factors. The authors enquire whether this is the case with their *A. quadrimaculatus* and *P. vivax*, and hope to obtain a strain of Anopheles which would be highly and also uniformly susceptible.

The authors make brother-sister matings in their laboratory strain, having given the females a blood meal which is later shown to have infected some of them. The technique of rearing is based on long experience. Rearing of separate families and attempts to infect are

continued for several generations. In every family some females (generally a large majority) become infected, others not. No simple genetical explanation covers the facts, but, as the authors observe, there are many other factors to be considered, and if possible eliminated.

P. A. Buxton.

BRUCE, C. O., KNIGIN, T. D., YOLLES, S. F. & GRAHAM, A. E., Jr. **Report on Species of Anopheles in British Guiana.** *Amer. J. Trop. Med.* 1943, July, v. 23, No. 4, 437–44.

In a small area in British Guiana the authors have collected 14 species of Anopheles, several of them new to the colony and one new to science (but not yet described). [They refrain from calling attention to the fact that their paper, which arises from American needs, gives us the first adequate list of the Anopheles of this British colony.] The following species were found: *nimbus, kompi, darlingi, triannulatus, emilianus* ? (*aquasalis* ?), *oswaldoi*, sp. Goeldii series, *argyritarsis, peryassui, apicimacula, punctimacula, shannoni, intermedius, mediopunctatus*, sp. nova. Two other species, *viz., albitarsis* and *bellator*, which have been reported as occurring or probably occurring, were not found by the authors. *P. A. Buxton.*

DA FONSECA, J. A. B. & DA FONSECA, F. Transmissão da malaria humana por anofelinos da série *tarsimaculatus*. [**Transmission of Human Malaria by Anophelines of the** *tarsimaculatus* **Series.**] *Mem. Inst. Butantan.* 1942, v. 16, 93–124, 24 figs. on 12 pls. [53 refs.] English summary.

In the island Santo Amaro off the coast of S. Paulo very near the city of Santos is Guarujá, a much frequented bathing resort. Here endemo-epidemic malaria is prevalent; both *P. vivax* and *P. falciparum* infections occur. The capture of 4,844 specimens, adults and larvae, revealed the presence of five species or subspecies of Anopheles: *A.* (*N.*) *oswaldoi guarujaensis* (*A. tarsimaculatus*), *A.* (*N.*) *oswaldoi oswaldoi* (*A. tarsimaculatus oswaldoi*), *A.* (*A.*) *eiseni*, *A.* (*Arr.*) *intermedius* and *A.* (*K.*) *cruzi*. *A. oswaldoi guarujaensis* Ramos formed 57·8 per cent., and *A. oswaldoi oswaldoi* Galvão & Lane 27·2 per cent. of the total catch. These two species, bred in the laboratory from wild females, were fed on *P. vivax* and *P. falciparum* gametocyte carriers, with the following results: *A. oswaldoi oswaldoi*, 12 per cent. of 115 infected with *P. vivax* and 3·8 per cent. of 105 with *P. falciparum*; *A. oswaldoi guarujaensis*, 46·4 per cent. of 56 infected with *P. vivax* and 28·5 per cent. of 42 with *P. falciparum*. The authors state that the greater sensibility to infection of *A. oswaldoi guarujaensis* revealed by these figures is exaggerated. When both subspecies were submitted to experiment under identical conditions there was no appreciable difference. In the very complete protocols details are recorded regarding the duration of the cycle of development of both *P. vivax* and *P. falciparum* in Anopheles of both subspecies at different seasons of the year.

A. oswaldoi guarujaensis is the predominant mosquito captured in houses in Guarujá; 165 specimens so caught were dissected and oöcysts were found in three. It is concluded that this subspecies was responsible for the malaria epidemics in 1940 and 1941 in that resort.

The report is lavishly illustrated with 24 microphotographs chiefly of oöcysts and sporozoites but including illustrations of the eggs of the two subspecies and the larval structure of *A. oswaldoi guarujaensis.* Two tables contain details of published reports concerning the experimental infection and the natural infection of species of Anopheles represented in the Brazilian fauna. *Norman White.*

VAUCEL, M. & CAMPOURCY, A. L'anophélisme au Cameroun Français. [**The Anopheles of the French Cameroons.**] *Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1943, Jan., v. 2, No. 1, 85–8.

Anopheles gambiae is the commonest species along the coast, in the forest zone and in the mountains; in the latter it accounts for 90 per cent. of the collections. In the savannah country, however, it is less prominent (30 per cent.), and *A. pharoensis* is more in evidence. *A. funestus* occurs in all these zones, as does *A. splendidus,* except that in the mountains it is very rare. Ten other species are named but each does not represent more than about 1 per cent. of the collections. Seasonal variations are slight.

Sporozoite indices are recorded :—*A. gambiae* 14·3 (26·6 in the first part of 1942), *A. funestus* 7·4, *A. splendidus* 8. In several similar villages of varying gametocyte indices the sporozoite index of *A. gambiae* showed a relation to the gametocyte index. In one small village, however, where the gametocyte index was 7, the sporozoite index was 25·5; here the standard of living was relatively high.

The breeding places of *A. gambiae* are so many and so widespread that, in the opinion of the authors, no serious efforts at control can be made in rural areas; anti-larval measures have, however, been instituted at Douala and Yaoundé, but measures against adults are left to individual initiative. *Charles Wilcocks.*

COGGESHALL, L. T. **Immunity in Malaria.** *Medicine.* 1943, May, v. 22, No. 2, 87–102, 2 figs. [45 refs.]

This lecture covers in a masterly manner the contributions made in recent years to our knowledge of immunity in malaria. Special attention is paid to those studies demonstrating the existence and behaviour of certain antibodies acquired during the development of immunity; the rôle of these antibodies is essential for the protection of the host. It is probable that the protective substances in the immune serum sensitize the parasite, making it more vulnerable to phagocytosis. The behaviour of malarial antibodies is similar to that observed in the immunological reactions of any host in its attempt to defend itself against pathogenic organisms in general. The eradication of latent malaria in experimental animals by chemotherapy is followed by a complete loss of immunity after a brief interval. The eradication of an acute infection in its early stage leaves the host with no immunity whatever.

[An adequate summary of a lecture covering so wide a field is not possible. Nearly all the literature on which the author draws has been duly summarized in this *Bulletin.*] *Norman White.*

AITKEN, G. J. **Sternal Puncture in the Diagnosis of Malaria.** *Lancet.* 1943, Oct. 16, 466–8.

This paper is concerned with the value and limitations of sternal puncture as a diagnostic method in malaria. A stout lumbar puncture needle serves well for sternal puncture ; a piece of glass or metal tubing with a rubber buffer at each end attached so as to allow only half an inch of free needle to protrude is a useful safety device. Local anaesthesia is used. The puncture is made in the middle of the sternum at the level of the second interspace. When the marrow is penetrated the resistance decreases appreciably. From 0·5 to 1 cc. of marrow blood is aspirated. Films may be made directly and stained with a Romanowsky stain.

Sternal puncture was made in 95 cases in which serial thick blood drops taken at six-hourly intervals had proved negative ; parasites were found in 39 patients by this means. Sixty of the 95 cases were clinically atypical ; in 13 of these patients parasites were demonstrated by sternal puncture.

The author describes the artefacts, commonly seen in marrow films, which may simulate plasmodia. "The interpretation of stained preparations of sternal marrow fluid, especially thick drops, is not a responsibility to be undertaken lightly by the inexperienced." He concludes that sternal puncture, which is easily performed, is of value ; it elucidates the diagnosis in a number of cases of obscure illness. Malaria parasites and their metabolic-disintegration products are more numerous in the sternal bone-marrow than in the peripheral blood. *Norman White.*

RUMBALL, C. A., PARSONS-SMITH, B. G. & NANCEKIEVILL, L. **Sternal Puncture in the Diagnosis of Malaria.** *Lancet.* 1943, Oct. 16, 468–9.

Of 294 unselected cases of malaria treated in hospital in the Middle East, diagnosis by peripheral blood examination was made in 256 and by sternal puncture in 38. Peripheral blood examination failed to reveal parasites in any of these 38 patients. Sternal puncture enabled a heterogeneous group of apparently unrelated illnesses to receive appropriate diagnosis and treatment. It is of special value in latent malaria. Of the illustrative cases described the most interesting are those of patients with predominantly psychological symptoms of neurasthenic or affective disorder type. The discovery of *P. falciparum* by sternal puncture, followed by appropriate treatment, resulted in complete recovery. This method of diagnosis is accessory to peripheral blood examination ; it does not replace it. *Norman White.*

YU, N. G. & YING, Y. Y. **Comparative Merits of Peripheral Blood Smear, Ephedrine Provocative Test and Sternal Puncture in the Diagnosis of Malaria.** *Chinese Med. J.* Washington. 1943, Jan.–Mar., v. 61, No. 1, 31–7. [37 refs.]

A hundred cases of malaria were studied, 67 subtertian and 33 tertian. Blood smears of all cases were examined. Sternal puncture was carried out in 90 cases and the ephedrine provocative test was used in 34. The provocative test consists of the hypodermic injection of 0·03 gm. of ephedrine, blood smears being made 15, 30 and 60 minutes

after the injection. The amount of aspirated fluid in sternal punctures never exceeded 0·2 cc. The percentage of positive findings with sternal puncture was 90; with the ephedrine provocative test 70·6; and with peripheral blood smears 54. Both sternal puncture and the ephedrine test are very helpful in the diagnosis of chronic cases of malaria. The relative value of the tests is discussed in relation to duration of illness, previous attacks of malaria, height of temperature, size of spleen, antimalarial drugs that have been taken, and the type of infection. *Norman White.*

DAO, L. Sobre un caso de hepato-esplenomegalia paludica gigante prococando sindrome de compresion intestinal. [**A Case of Malarial Splenomegaly causing Symptoms of Intestinal Obstruction.**] *Bol. Hospitales.* Caracas. 1943, Jan.–Apr., v. 42, Nos. 1–2, 26–34, 3 figs.

An account is given of an uncommon complication in a case of benign tertian malaria of at least five years' duration in a man of 32 years of age. The spleen was greatly enlarged, extending to the pubes and right iliac region and the liver was palpable three fingers' breadth below the ribs. Associated with the condition were recurrent attacks of constipation and abdominal pain, amounting to temporary obstruction, which the author attributes to mechanical compression by the enlarged spleen. In making a differential diagnosis he was able to exclude ascites, schistosomiasis and Chagas's disease; splenic puncture to exclude kala azar was not done owing to the patient's condition.

Examination of the blood showed 1,792,000 erythrocytes, 1,500 leucocytes (6 per cent. eosinophiles) and 35 per cent. haemoglobin. Hookworm eggs were found in the faeces.

He was treated with atebrin and plasmoquine, followed by quinine and was also given liver extract, iron and iodine, while his infection with hookworm was treated with tetrachlorethylene. Great improvement was observed after a few months. *J. F. Corson.*

J. AMER. MED. ASS. 1943, Sept. 25, v. 123, No. 4, 205–8. **The Drug Treatment of Malaria, Suppressive and Clinical.**

This is a circular letter from the Office of the Surgeon General of the U.S. Army. It is admirably clear and concise. An adequate summary is impossible but attention will be directed to a few points of importance. The efficacy of quinine, mepacrine (atabrine) and pamaquin (plasmoquine) is compared: the routine use of pamaquin is not advised. Mild disagreeable symptoms may attend the suppressive use of mepacrine; if they do they usually follow one of the first few doses and are more apt to occur if the drug be given between meals. Sodium bicarbonate or sweetened drinks given with the mepacrine may prevent such symptoms. Mepacrine in the usual suppressive doses does not affect the flight capacities of aviators, but some have found the mild symptoms caused by suppressive quinine troublesome. The limitation of the supply of quinine makes its use for suppressive treatment prohibitive save in exceptional circumstances.

Suppressive treatment has its chief use among troops operating in malarious country where it is impossible to give them full protection from mosquitoes. Mepacrine should be used for this purpose. There

are advantages in starting suppressive treatment in advance of exposure. With the doses used the maximum concentration of the drug in the plasma is not attained until after the third week. Seasickness may contraindicate the administration of mepacrine before arrival in the malarious region. Suppressive treatment should not be stopped until the men have arrived at a base where adequate medical care is available; clinical malaria is apt to follow cessation of suppressive treatment. Mepacrine for suppressive treatment should be given in doses of 0·1 gm. at the evening meal six days a week (0·6 gm. a week) or 0·05 gm. once a day at the evening meal for six days and 0·1 gm. on the seventh evening (0·4 gm. a week). If quinine has to be used for suppressive treatment, 10 grains a day should be given.

In the treatment of the clinical attack it is advised that 0·2 gm. mepacrine and 1 gm. sodium bicarbonate with 200 or 300 cc. of water, or sweetened tea or fruit juice, be given every six hours for 5 doses, followed by 0·1 gm. thrice daily after meals for six days (2·8 gm. in seven days). For quinine the doses are 15 grains thrice daily after meals for two days, and then 10 grains thrice daily for five days (16 gm. in seven days). If parenteral administration be indicated mepacrine dihydrochloride 0·2 gm. in 5 cc. sterile distilled water [with slight warming to dissolve it if necessary] should be injected into each buttock. One or two additional doses of 0·2 gm. may be given intramuscularly if necessary, at intervals of 6 to 8 hours. For intravenous administration of quinine 10 grains of the dihydrochloride in not less than 200 cc. of sterile isotonic salt solution should be given slowly. Numerous other useful indications are given regarding the care of the patient, relapses, records, follow-up and other matters. [It is an excellent circular.] *Norman White.*

TALBOT, D. R. **New Aspects of Malaria.** *J. Amer. Med. Ass.* 1943, Sept. 25, v. 123, No. 4, 192–4.

This paper relates the experience of a medical officer in charge of an outlying military base around which marshland and jungle precluded the possibility of effective antilarval measures. Malaria was hyperendemic in an adjacent native community, the members of which had a 95 per cent. malaria parasite infection rate. In the base were both military and naval personnel. The army group received atebrin as a suppressive 0·15 gm. twice daily two days a week; the navy group received no prophylactic medication but treatment was given if symptoms arose or if malaria parasites were found in the blood. There was a high incidence of frank malaria in the navy personnel; in the army group the incidence was low but cases were much more severe and slower to respond to treatment. The only two cases of cerebral malaria were in the army group.

Later the procedure was changed. Monthly examinations of the blood of all members of the force were made. All army parasite carriers received intensive quinine treatment for four weeks (doses not stated) This kept almost all the group from having clinical malaria. Naval men who harboured parasites received routine quinine and atebrin treatment. The initiation of routine blood examinations showed that 66 per cent. of those in the naval group were infected (*P. falciparum* 65, *P. vivax* 35 per cent.). Of army personnel 48 per cent. harboured parasites, *P. falciparum* infections predominating. The author does not

advocate the use of suppressive medication except in an area of active combat, in endemic country. In the treatment of the acute case he advocates the use of quinine and atebrin combined.

A large part of the paper is concerned with the multiplicity of signs and symptoms to which malaria may give rise and which are responsive to antimalaria treatment; all patients in such hyperendemic areas should be considered as suffering from malaria until this diagnosis is disproved. *Norman White.*

ANNEGERS, J. H., SNAPP, F. E., PASKIND, L., IVY, A. C. & ATKINSON, A. J. **Retention of Atabrine in Animal Body. Excretion in Bile and Urine and Effect on Cholic Acid Output.** *War Medicine.* Chicago. 1943, Aug., v. 4, No. 2, 176–86, 1 chart.

A review is given of the literature. According to unpublished results by J. V. SCUDI, when mepacrine (atabrine) is given to rats by mouth, the urinary excretion is never above 1·6 per cent. of the dose given on a single day, but 0·5 per cent. is still being excreted in the urine 13 days after the drug has been stopped. After giving an oral dose of 45 mgm. per kgm., Scudi recovered about 15 per cent. of the dose from the liver and 2 per cent. from the spleen 24 hours later; after 72 hours, 10 per cent. was recovered from the liver. When 50 mgm. per kgm. were given the liver contained 30 per cent. on the first and third days, 10 per cent. on the eighth and 5 per cent. on the 15th day. Fifteen days after the last of 10 daily doses of 10 mgm., 12 per cent. of the total dose was recovered from the liver.

The present authors treated rats (200 gm.) subcutaneously with 5 mgm. mepacrine dihydrochloride daily for five days (total 25 mgm.); the rats were killed at intervals and the amount of mepacrine present in the whole body was estimated, with the following results:—

Days after last dose.	*Average amount recovered.*
1	7·37 mgm.
3	6·53 ,,
7	2·35 ,,
12	1·33 ,,
17	2·31 ,,
28	0·58 ,,
40–42	trace

Five dogs were given thrice daily oral doses of 33–50 mgm. for seven days. They were killed at intervals and the liver examined.

Total dose mgm.	Days after last dose	Recovery of mepacrine from liver	
		mgm.	Percentage of dose
1,050	1	63·3	6·0
700	3	34·0	4·8
850	10	14·6	1·4 (Spleen 1·06 mgm.)
850	17	17·2	2·2
700	52	3·58	0·51 (Muscle, 0·22 mgm./100 gm.)

Experiments were then made by giving mepacrine to dogs with biliary fistulae. With single daily doses of 100 mgm. the percentage of the dose recovered from the bile in 24 hours was (average) 4·8 when the bile was not returned to the intestine and (average) 8·0 when the

bile was returned every 8 hours. Urinary excretion of mepacrine was 4 per cent. without the return of bile and 5·2 per cent. when bile was returned to the intestine. Excretion of mepacrine in the bile and urine persisted for not more than 3 or 4 days after administration was stopped, and the total recovery in the two secretions was 9·7 per cent. without return of bile and 11·5 per cent. with return of bile. Mepacrine did not appear in the faeces of intact dogs. Accordingly it is concluded that there is no large circulation of mepacrine from bile to intestine, to liver, to bile again. Evidently in the dog mepacrine is rapidly destroyed or conjugated so that it is not excreted as such in the urine or bile. It is not stored in the liver, spleen or muscle to any significant extent in dogs; and in rats it is removed from the body, mostly within a few days, completely within a few weeks.

In individual dogs, great variations occurred in the output of cholic acid during the administration of mepacrine but on the average the depression of output was only 2 per cent. In certain cases depressions of 14–21 per cent. occurred, suggesting that in these animals the liver may possibly have suffered injury; but the evidence is inconclusive.

F. Hawking.

Das Gupta, B. M. & Siddons, L. B. **Studies on the Action of Different Brands of Atebrin in Human and Simian Malaria.** *Indian Med. Gaz.* 1943, June, v. 78, No. 6, 291–5.

Seven cases of human malaria were treated with mepacrine hydrochloride manufactured by the Bengal Chemical and Pharmaceutical Works, Ltd. The results, which are recorded in detail, show that its action was exactly comparable with that of atebrin. Of six monkeys infected with a virulent strain of *P. knowlesi* four were treated with atabrine (Winthrop Chemical Co., U.S.A.) and two with the Bengal product. All the animals survived the primary infection with a strain which is invariably fatal if untreated. *Norman White.*

Wright, C. I. & Lillie, R. D. **Toxic Effects of Atabrine and Sulfadiazine in Growing Rats.** *Pub. Health Rep.* Wash. 1943, Aug. 13, v. 58, No. 33, 1242–50, 5 figs.

Groups of ten rats were given mepacrine (atabrine) by stomach-tube daily for eight weeks. The dose was initially 20 mgm. per kgm. As the rats became tolerant, the dose was gradually raised to 80 mgm. per kgm. This dosage caused arrest of growth and various pathological changes in the organs. Riboflavin in doses of 5–10 mgm. per kgm. did not diminish these toxic effects. With a lower dose of mepacrine, *e.g.*, 30 mgm. per kgm. daily, the toxic effects were only slight. The pathological changes found at autopsy consist of "pigment cell infiltration of the intestinal mucosa, lymph nodes, spleen, and liver, an interstitial and exudative monocytic pneumonia, a focal myocarditis and myositis, and often portal thrombi and hepatic infarcts. A moderate splenic hemosiderosis and a heavy nonferrous pigmentation of the epithelium of renal glomeruli and medullary tubules are also present." Sulphadiazine alone or in combination with mepacrine produces a late growth arrest but does not cause appreciable pathological lesions: it does not increase the toxicity of mepacrine.

[It must be realized that these toxic effects are produced only by very heavy prolonged dosage, much exceeding that which is used clinically.

The distribution of the lesions may be influenced partly by the route of mepacrine, after absorption from the intestine, which passes through the liver, heart and lungs before reaching the general circulation; some is excreted through the kidney.] *F. Hawking.*

MANN, W. N. **Haemoglobinuria following the Administration of Plasmoquine. With Note by** Sidney SMITH. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943, Sept., v. 37, No. 2, 151–6.

A young soldier, a native of Nyasaland, was treated for subtertian malaria with quinine sulphate, 30 grains daily for three days, then atebrin 0·1 gm. thrice daily for five days, and finally, after an interval of three days, plasmoquine, 0·01 gm. thrice daily for four days. Three days later his temperature rose to 100°F. and he vomited; on the following morning his temperature was 99°F., pulse 116, and he was observed to be remarkably pale. His urine was dark chocolate in colour, alkaline and gave a strongly positive guaiac test for blood; large numbers of epithelial cells were present and a few erythrocytes. His blood was examined next day: erythrocytes 1,600,000; haemoglobin 30 per cent.; colour-index 0·92; leucocytes 16,500; blood group 0. The urine was still dark chocolate in colour and contained many epithelial casts and a fair number of erythrocytes. He was given a transfusion of 12 ounces of blood, although in a cross grouping test his serum produced some delayed agglutination of the donor s cells; no reaction followed the transfusion.

He was treated with alkalies and iron and recovered after about a month. Haemagglutinins could no longer be demonstrated in his serum eight days after the transfusion. There had been no jaundice and the author thinks that this indicates that the haemoglobin was rapidly excreted in the urine. He concludes that plasmoquine appears to have two toxic effects: the production of haemagglutinins which are not specific to the patient's red cells, and the production of a haemolysin and a toxin with a direct action on the renal tubules.

Commenting on the case Brigadier Sidney SMITH suggests that it may have been one of classical blackwater fever precipitated by plasmoquine [a case of plasmoquine poisoning with similar symptoms but not associated with malaria is reported in this *Bulletin*, 1927, v. 24, 741]. *J. F. Corson.*

JOHNSON, C. E., Jr. **Status of Sulfonamide Therapy in Malaria.** *Amer. J. Med. Sci.* 1943, Sept., v. 206, No. 3, 327–36, 2 figs.

The author refers to his independent discovery (1942) of the antimalarial action of sulphadiazine and sulphathiazole in patients undergoing malaria therapy with *P. malariae*. The findings of SCHWARTZ *et al.* [this *Bulletin*, 1942, v. 39, 601] with sulphathiazole and of COGGESHALL *et al.* [this *Bulletin*, 1939, v. 36, 824; 1942, v. 39, 395] with other sulphonamide derivatives are also summarized. The observations here recorded concern 13 patients therapeutically infected with *P. malariae* and one with *P. vivax* who were treated with sulphadiazine. The strain of *P. malariae* has been in constant use for more than 10 years and has long since become "asexualized." In only one case was there any intolerance of the drug; this patient vomited within a few minutes of taking it. This case is omitted in assessing the results of treatment. The daily dose of sulphadiazine given was

limited to 4 gm., or less, except for the first one or two days when larger doses were given to build up the blood level. The treatment lasted four days for four patients, five days two patients, seven days two patients, eight days two patients, nine days one patient, and 10 days three patients. The total dosage varied from 24 to 48 gm. In all cases there was a cessation of fever and a disappearance of parasites from the peripheral blood. Three of the 13 patients had a relapse; these had been treated for eight, five and nine days respectively. One of these was a parasite relapse only without clinical symptoms. The relapses were controlled by a second course of sulphadiazine. No patient had a second relapse. The patients had been kept under observation for periods varying from 70 to 264 days after the termination of treatment. The urine of all patients undergoing sulphadiazine treatment should be examined. The appearance in the urine of sulphadiazine crystals with red cells is an indication for the discontinuance of treatment. *Norman White.*

CURD, F. H. S. **The Activity of Drugs in the Malaria of Man, Monkeys and Birds.** *Ann. Trop. Med. & Parasit.* 1943, Sept. 7, v. 37, No. 2, 115–43. [277 refs.]

In order to indicate the present position of testing for antimalarial drugs and the possibilities offered by the numerous species of avian malaria for the development of new methods of testing, the activity of a large number of antimalarial drugs on human, monkey and avian malaria is presented in tabular form. These tables and the author's references should prove very useful to those working on the subject but they cannot be reproduced in an abstract. *F. Hawking.*

CLARK, H. C. **Review of Recent Research on Drug Prophylaxis and Treatment of Malaria.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 1, 31–8. [24 refs.]

COLLIGNON, E. La campagne antipaludique de 1942 dans le département d'Alger. [**Antimalaria Campaign in 1942 in the Department of Algiers.**] *Arch. Inst. Pasteur d'Algérie.* 1943, June, v. 21, No. 2, 55–64.

In spite of the presence of an abnormally large number of susceptible individuals, from the hills and from abroad, there were in 1942 only localized outbreaks of malaria in the Department of Algiers. March and April were unusually dry months. The usual temporary anopheline breeding places were absent and prolonged dryness caused the disappearance of what are generally persistent collections of water. On the other hand breeding places appeared in a few water-courses that are usually flushed by rain storms. Protective measures were confined to 16 centres of colonization. These consisted in the prophylactic administration of quinine, or in some cases quinacrine [atebrin], to children from 1 to 15 years of age, and of small scale antilarval measures, including the use of Gambusia. Shortage of transport rendered impossible an adequate supervision of antilarval measures, which suffered accordingly with unfortunate but very localized results. *Norman White.*

COCHRANE, E. & NEWBOLD, C. E. **Notes on Design and Performance of a Flushing Siphon.** *Ann. Trop. Med. & Parasit.* 1943, Sept. 7, v. 37, No. 2, 108–14, 4 figs.

In the Tempé valley, near St. George's, the capital of Grenada, is a stream not more than 6 feet wide at any point, with a rocky winding bed, a good fall and many small grass-edged pools productive of *A. argyritarsis*. This species is easily infected experimentally but it has never been incriminated as a vector, though it is strongly suspect in the Tempé valley as elsewhere. Cochrane observed that floods during the rainy season swept the larvae of this species from their usual habitat and that a marked decrease of malaria incidence followed. It was therefore decided to reproduce these flushing conditions in the drier seasons by the installation of a flushing siphon 300 yards above the settlement. Details are given of the construction of this siphon and dam and of the modifications that were introduced as the result of experience. The design was based on that of Macdonald's modification of de Villiers automatic siphon. An unexpected complication was the frequent blocking of ¾ in. pipes by crayfish that abound in the stream. The improved design that is suggested at the end of the paper as the result of experience should be of interest to all faced with similar problems. When the siphon worked well mosquito breeding was almost eliminated for 400 yards downstream, and was markedly less from 400 to 800 yards below the dam. *Norman White.*

BOL. OFICINA SANITARIA PANAMERICANA. 1943, June, v. 22, No. 6, 502–5. English summary. Aspectos de la campaña antipalúdica en la República de Panamá. [**Antimalaria Campaign in the Republic of Panama.**]

This is a brief account of routine antimalaria measures carried out by the Malaria Section of the Ministry of Health and Public Works of the Panama Government. In centres of population in the interior of the country more than 300 mosquito breeding places are kept under constant observation and control. These breeding places are of very diverse kinds; those that are deprived of vegetation and exposed to the sun are the most dangerous in that they are productive of *A. albimanus*, which is by far the most important vector. Other species found are *A. argyritarsis*, *A. pseudopunctipennis*, *A. apicimacula*, *A. punctimacula*, *A. albitarsis*, *A. strodei* and *A. neomaculipalpus*. Paris green is favoured as a larvicide. Nothing is said of the intensity of malaria endemicity in the interior of the country. The spleens and blood of school children are examined periodically and health propaganda efforts are achieving some success. *Norman White.*

NESTERWODSKAJA, K. M. & LUBINSKI, G. A. Anwendung von Thiodiphenylamin in der Anopheleslarvenbekämpfung. [**Phenothiazine for the Control of Anopheles Larvae.**] *Deut. Trop. Ztschr.* 1943, May 15, v. 47, No. 10, 252–62, 6 figs. [23 refs.]

The authors confirm the high toxicity of phenothiazine (thiodiphenylamine) to mosquito larvae. Dosages of 0·5 and 1·0 mgm. per 100 sq. cm. at 18–21°C. killed all stages of Anopheles larvae in the laboratory in 24 and 6 hours respectively. Contact with the poisonous dust for 1–1½ hours was sufficient to cause the ultimate death of the larvae. Under the same conditions only 40–50 per cent. of Culex larvae were

killed. In field trials at 12–13°C. with dosages of 7 and 14 oz. per acre all Anopheles larvae had disappeared in 48 hours. Phenothiazine is not less toxic to fish than Paris green: a dosage of 1 mgm. per 100 sq. cm. in an aquarium killed 10 per cent. of the fish in four days. But it is practically harmless to mammals. *V. B. Wigglesworth.*

ROY, A. N. & MUKERJEE, S. **Some Observations on the Complement in the Serum of Monkeys during Infection with** *Plasmodium knowlesi.* *Ann. Biochem. & Exper. Med.* 1942, v. 2, No. 4, 245–50.

In normal monkeys the complement content of the blood serum is such that on an average one unit is contained in 0·2 cc. of 1 in 5 dilution of serum. During the incubation period and the early phases of a *Plasmodium knowlesi* infection there is little variation from this figure. In the later stages of the infection, when more than 20 per cent. of the red blood corpuscles harbour parasites, there is a rapid depression till on an average during the last 24 hours before the fatal termination one unit is contained in 1·04 cc. of the diluted serum. In monkeys which survive the acute infection and pass into a chronic phase there is little variation from normal. *C. M. Wenyon.*

BARANGER, P. & THOMAS, P. E. **The Action on Avian Malaria of the Alkaloids of Cinchonas from the Cameroons and the Belgian Congo.** *Biochem. J.* 1943, Sept., v. 37, No. 3, 342–4. [22 refs.]

The authors have carried out tests on avian malaria with a view to the estimation of the therapeutic efficiency of *Cinchona succirubra* and *C. ledgeriana* from the Cameroons and the Belgian Congo. The tests were made on canaries inoculated with *Plasmodium relictum*, the drugs having been administered in the form of pellets with cornflour, which the birds readily swallowed. The tests indicated that the total alkaloids had an effect similar to, if not better than, that of quinine. Industrial and laboratory-prepared materials were of equal value. The total alkaloids from which the quinine had been extracted had a poor therapeutic effect. *C. M. Wenyon.*

ADLER, S. & TCHERNOMORETZ, J. **The Development of Gametocytes from Extra-Erythrocytic Forms in** *Plasmodium gallinaceum.* *Harefuah.* Jerusalem. 1943, Sept. 1, v. 25, No. 5. [In Hebrew. English summary 83.]

"Adult fowls shortly after inoculation with *Plasmodium gallinaceum* by the bites of mosquitoes *Aëdes aegyptii* were subjected to intense quininisation (injections of 150 mgms. quinine hydrochloride daily).

"Quininisation was stopped when the red cells showed a sufficient infection with small non-pigmented parasites. The extra-erythrocytic forms were the only possible source of these parasites in the red cells.

"The development of the parasites in the red cells after cessation of quinine was studied.

"It was found that young gametocytes could be recognised 27½ hours after the cessation of quinine and they approach their maximum size before the first cycle of erythrocytic schizogony is completed.

"It is therefore proved that extra-erythrocytic forms produce merozoites which invade red cells and develop directly into gametocytes."

ZAIN, H. & WOLF, A. Einfluss der Röntgenstrahlen auf die Entwicklung der Endothelstadien der Vogelmalaria (*Plasmodium gallinaceum*). [**Influence of X-Rays on the Development of the Endothelial Stage of Bird Malaria** (*P. gallinaceum*).] *Deut. Trop. Ztschr.* 1943, Feb. 1, v. 47, No. 3, 68–71.

With the object of discovering whether exoerythrocytic schizonts are affected by exposure to Röntgen rays, thin slices of brain of fowls containing these developmental forms of *Plasmodium gallinaceum* were exposed to rays in varying doses. Subsequently the treated brain material was inoculated into the breast muscles of uninfected fowls. At the same time similar portions of untreated brain were inoculated to other birds. In no case was there evidence that the schizonts in the treated brains produced more or fewer schizonts than were produced by those in the untreated brains. In another series of experiments the fowls themselves were exposed to rays immediately or soon after the inoculation of brain containing exoerythrocytic schizonts. In most cases there was no evidence of increase or decrease in the expected number of schizonts which appeared subsequently in the brains. In a few cases, however, there was an indication that an increase had occurred and this was in the case of fowls exposed to small doses of rays. An explanation of this may be found in the fact that exposure to such doses is known to activate the reticulo-endothelial system, as evidenced by an increased phagocytosis of injected pigments. It has also been shown by SCHULEMANN and KNOCHE [this *Bulletin*, 1942, v. 39, 25] that the injection of colloidal palladium not only activates the reticulo-endothelial system but also increases the number of exoerythrocytic schizonts which develop in the brains of inoculated fowls. *C. M. Wenyon.*

RUSSELL, P. F., BADRI NATH MOHAN & PUTNAM, P. **Some Observations on Spleen Volume in Domestic Fowls in the Course of** *Plasmodium gallinaceum* **Studies.** *J. Parasitology.* 1943, June, v. 29, No. 3, 208–16, 1 fig. [11 refs.]

The authors have studied the volume of the spleen in normal fowls, in those subjected to inoculations with sheep serum or inactivated sporozoites or infection with *Plasmodium gallinaceum*. In some fowls a combination of injections and infections was studied. The average volume of the spleen of 17 normal fowls 10 weeks old was 0·88 cc. Vaccination with inactivated sporozoites or serum from normal sheep, as also serum from fowls suffering from chronic malarial infection, brought about an increase in volume of the spleen due chiefly to increase in the lymphoid tissue. Malarial infection produced enlargement and there was no significant difference between blood-inoculated and mosquito-infected groups. As the infection became chronic and progressed the volume decreased. The largest increase occurred in fowls with chronic malaria, which had been subjected to both vaccination and serum treatment. *C. M. Wenyon.*

WOLFSON, F. **Further Studies of the "3T" Strain of** *Plasmodium cathemerium* **in White Pekin Ducks.** *Amer. J. Hyg.* 1943, May, v. 37, No. 3, 325–35, 8 figs. on 2 pls.

The author has already shown that ducks can be infected with the "3T" strain of *Plasmodium cathemerium*, which was isolated from a

wood thrush and established in canaries in 1937. Though exoerythrocytic schizonts were found in a canary infected by sporozoites of this strain and in all the canaries infected subsequently by blood inoculation, these forms have never been detected in ducks. Though the infection in the ducks reached an intensity of 4,000 parasites per 10,000 red cells, the ducks invariably recovered and remained in a state of chronic infection. On this account the infection in the duck was of less value for chemotherapeutic work than that of *P. lophurae*, which invariably gave rise to more intense infections which terminated fatally. With a view to a possible modification of the infection produced by the "3T" strain, a series of rapid passages was carried out after inoculation of large doses of infected red cells. It was determined that the cycle was one of 24 hours and that the procedure adopted increased the intensity of the infection in the duck to such an extent that in some cases it proved fatal. The conclusion is that the type of infection is one which may prove satisfactory for malarial, particularly chemotherapeutic, research. *C. M. Wenyon.*

Erratum.

In the abstract of the paper by Glazko on the estimation of quinine in urine [this *Bulletin*, 1943, v. 40, 880] an error was made in the description of technique. On page 881, line 11, for "To 5 cc. of urine in a test tube 5 cc. of the reagent are added," read "To 5 cc. of urine in a test tube 5 *drops* of the reagent are added."

BLACKWATER FEVER.

Findlay, G. M. **Mobile Blackwater Fever Treatment Teams.** *J. Roy. Army Med. Corps.* 1943, Sept., v. 81, No. 3, 113–18, 2 figs.

A person suffering from blackwater fever needs medical treatment and skilled nursing, night and day, as soon as possible; he also requires absolute rest in bed. It is therefore often necessary to visit and treat him in places far distant from a hospital. In the present military conditions in West Africa these difficulties have been met by trained blackwater fever teams stationed at all General Hospitals and at most of the Casualty Clearing Stations. Each hospital team consists of one Medical Officer, one or two Nursing Officers [sisters] and two Nursing Orderlies, but teams provided by Casualty Clearing Stations have no Nursing Officers and have, instead, two additional Nursing Orderlies. The team should be ready to leave its station at an hour's notice. The equipment, in addition to the personal requirements of the team, includes the materials for infusion and blood transfusion, for blood-grouping and for microscopical examination of the blood; quinine, atebrin and other drugs; eight oxygen cylinders, beds and bedding

and general nursing equipment; cooking utensils, milk, tea, sugar, champagne, fruit drinks, &c. These are given in a list containing 134 items [but no stain for blood films is included].

It has sometimes happened that no medical officer or blackwater fever team has been available for some hours, so instructions for giving first aid have been issued; these emphasize complete rest in bed, the administration of weak tea with sugar and of alkaline drinks, and the immediate despatch of a messenger to call medical aid. These arrangements have been an important factor in reducing the mortality of blackwater fever. *J. F. Corson.*

ROBERTSON, F. **A Case of Blackwater Fever.** *Newcastle Med. J.* 1942, Dec., v. 21, No. 4, 115–21.

The author describes a severe case of blackwater fever, following malaria contracted on the Gold Coast, with recovery after treatment by repeated blood transfusions. In an endeavour to prevent circulatory overloading the final transfusion consisted of the cells of two pints of blood given at the same time as a corresponding volume of the patient's own blood was withdrawn. *F. Murgatroyd.*

TRYPANOSOMIASIS.

GAMBIA. ANN. MED. & SAN. REP. FOR YEAR ENDED 31ST DECEMBER, 1942. Appendix II. 9–11. **Extract from Captain MacGowan's Report on Gambia Sleeping Sickness Survey, undertaken with the Permission of D.D.M.S., West African Forces.**

Notes on surveys in three areas are given in this extract from Captain MacGowan's report; on the north bank of the River Gambia the people of villages in the Lower Baddilu district were examined while the other two areas (Bintang-Bwiam and Kanfinda-Sintet) are on the south side of the river.

In the Lower Baddilu area the infection rate was 1·4 per cent., while in 1939 it was found by BOWESMAN to be 4·2 per cent. In Kerewan itself, in this area, the rate (0·9 per cent.) was only one-seventh of that (6·9 per cent.) found by Bowesman. This reduced rate is attributed to the treatment of cases in the Kerewan Civil Dispensary during the last 3–4 years; in this dispensary there were no facilities for microscopical diagnosis, but the author thinks that about 70 per cent. of the diagnoses were correct. On the south side of the river, however, around Bwiam Hospital, similar conditions exist for treatment, yet the incidence of trypanosomiasis here was at least as high as that found by Bowesman. It is estimated that 6 out of 7 infected natives will not come for treatment. Excision of cervical glands is still practised by the natives [see TODD & WOLBACH, *Sleeping Sickness Bulletin*, 1911, v. 3, 336].

The author says that a trypanosomiasis campaign is urgently needed and a larger Medical Service is required; it is necessary also to educate the people in practical farming. *J. F. Corson.*

HORNBY, H. E. & FRENCH, M. H. **Introduction to the Study of Tsetse-Fly Repellents in the Field of Veterinary Science.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943, July, v. 37, No. 1, 41–54.

The authors report work directed towards the protection of domestic animals from tsetse.

The problem is peculiarly difficult, for one might protect man or animals from insect annoyance if one could reduce the attacks to a small number. But in the present case that would be insufficient, for the purpose is to protect from deadly trypanosomiasis, and of the flies some 5 to 10 per cent. are infective. Moreover, work of Dr. E. BURTT, here reported for the first time, shows that trypanosomes are ejected in large numbers as soon as the tsetse's proboscis enters the skin, so that a fly which probes, as distinct from sucking, can in actual fact transmit the infection. In addition it is clearly desirable that the repellent should be effective for at least 24 hours, and it must be available in quantity, easy to apply and so forth.

The authors developed a standard series of tests, in which conditions more and more approached the natural. They eliminated substances at successive stages in the testing for repellency and for harmlessness to an ox. They were finally left with no satisfactory material except pyrethrum extract. An instructive field test is described in which three donkeys sprayed each morning with pyrethrum extract (" 2 per cent. pyagra emulsion "), and two control donkeys, performed a five-day journey through a *Glossina morsitans* belt. Flies in numbers bit and worried the controls but not the treated donkeys. The experiment remained inconclusive, for no animal died of trypanosomiasis (except one control after two months).

The pyrethrum gave good protection in the shade, much less in sunlight. [It seems possible that a good pyrethrum chemist might help here. The authors appear to assume that it is the pyrethrins which are repellent, and this may be so, though no evidence is brought forward. Much more work clearly remains to be done after the war when it will be easier to obtain more precisely standardized extracts.]

The paper contains a long and varied list of materials tested and found useless. They range from simple salts to " a mixture of kerosene, fish oil and citronella oil emulsified with milk." *P. A. Buxton.*

PACKCHANIAN, A. **On the Viability of various Species of** *Trypanosoma* **and** *Leishmania* **Cultures.** *J. Parasitology.* 1943, Aug., v. 29, No. 4, 275–7.

The author has investigated the survival time of trypanosomes, leishmania and herpetomonas when cultivated in Novy and MacNeal's blood agar medium. The temperature at which the cultures were kept varied from 18° to 31°C. Out of 124 tubes of *Trypanosoma cruzi* kept for approximately 6 years, 13 tubes were found to contain actively motile trypanosomes. Of 291 tubes kept from 7 months to 5 years 11 contained active trypanosomes, while of 110 tubes kept about 6 months 68 contained motile trypanosomes. The viability of culture of *T. avium* and *T. rotatorium* was 3 and 4 months respectively when kept at a temperature not above 25°C. Cultures of *T. americanum*, *T. duttoni*, *T. lewisi*, *T. melophagium*, *Leishmania donovani* and *L. tropica* were negative for motile forms at the end of four months : in many instances, however, subcultures were obtained at the end of two

months and sometimes during the third month. A culture of *Herpetomonas muscae domesticae* was once found to be viable on blood agar slants after a period of six years. *C. M. Wenyon.*

MAZZA, S. & CHACON, R. V. Presencia de *Panstrongylus geniculatus* con infestación por *S. cruzi* en el oriente boliviano y otras informaciones relacionadas con la enfermedad de Chagas en esa región. [**Infestation of** *Panstrongylus geniculatus* **with** *T. cruzi* **in Eastern Bolivia; Chagas's Disease in this Region.**] Reprinted from *Prensa Méd. Argentina.* 1943, June 23, v. 30, No. 25, 15 pp., 4 figs.

Up to 1942 three transmitters of *T. cruzi* were known in Bolivia, namely *Triatoma infestans*, *Eutriatoma sordida* and *E. venosa*. In 1942 Mazza found two more, *E. oswaldoi* in dwellings in Sucre and its environs, and *Psammolestes coreodes* in birds' nests in Camiri. Infested insects, *Triatoma infestans*, were found as high up as Cochahamba, 2,559 metres, and other adjacent places, and as low down as Santa Cruz de la Sierra, 442 metres. The numbers of insects examined were small: 10 in Quillacollo (2 positive), 5 in Santa Cruz de la Sierra (2 positive), 21 in the southern parts of the district (1 positive), at another time 6 positive out of 12, and so on [the authors record these as 20, 40, 5 and 50 per cent. respectively, which is inclined to mislead]. In the department of El Beni, at Trinidad the capital, 236 metres above sea level, a male *Panstrongylus geniculatus* was captured in a house and found to be infested with evolution forms of *T. cruzi*. A child in a nearby house had suffered from fever for two months and had a swollen face and abdomen and some general oedema. Six blood-smears were examined but no parasites found. Also 88 children between 6 and 16 years of age from a school were examined but none was found positive. The authors refer to several patients presenting the clinical signs of Chagas's disease, but in no instance did they find the trypanosome, and xenodiagnosis when tried was negative. [In spite of this the authors claim to have shown that Chagas's disease exists both at high and low levels and that *Panstrongylus geniculatus* has now, for the first time, been recorded as a local transmitter.]

H. Harold Scott.

WOOD, S. F. **Observations on Vectors of Chagas' Disease in the United States. II. Arizona.** *Amer. J. Trop. Med.* 1943, May, v. 23, No. 3, 315–20.

This investigation was carried out at the Alvarado Mine, Arizona. During the periods May–October 1940, and June–September 1939 and 1941, cone-nosed bugs (male and female, adults and nymphs) were collected and examined. Over the whole period 1,022 specimens were collected and 570 examined; 28 (4·9 per cent.) were infected with *T. cruzi*. This brings the total of insect vectors of this trypanosome collected from Arizona to 1652; 699 have been examined and 28 (4 per cent.) found infected. The chief were *Triatoma rubida* and *T. longipes*. These are not very strong fliers, particularly the latter, and they are probably assisted by the early evening down-canyon breezes.

In the Alvarado Mine *T. longipes* is the most important vector; it is the most abundant, is the more highly infected, is closely associated with man and has a large capacity for ingesting blood.

The wood rat, *Neotoma albigula albigula* is remarkably resistant to, or tolerant of, bites of these insects. Thus, over a period of nearly six months, December 8th, 1940–June 15th, 1941, bugs fed at least 1,016 times on one of these rats, and on one day a *Rattus norvegicus* served to feed 164 nymphs of *T. rubida* and 12 of *T. longipes* without any apparent harm to the rat.

Xenodiagnostic experiments with native mammals, *Corynorhinus rafinesquii pallescens*, *Neotoma albigula albigula*, *Peromyscus crinitus stephensi* and two *Felis domesticus*, have all given negative results.

H. Harold Scott.

LEISHMANIASIS.

GIRAUD, P. & REVOL, P. Quelques données récentes sur le traitement du kala-azar. **Some New Ideas on the Treatment of Kala Azar.** *Presse Méd.* 1943, June 5, v. 51, No. 21, 291–2.

The authors, who have had considerable experience of the treatment of infantile kala azar in the South of France, give an account of the treatment of a number of cases with pentastib, an organic antimonial (aminophenylstibinate of methyl glucamine containing 6·5 per cent. of antimony) which they were obliged to use owing to the impossibility of procuring other products. This drug, which was primarily intended for veterinary use, was administered intravenously in the doses suitable for neostibosan, *viz.*, 2 to 20 cgm. for children under five years of age and 5 to 30 cgm. for older children and adults. [The antimony content of neostibosan is given as 42 per cent.] Three injections were given each week, the full course extending over five weeks (15 injections). To bring about a cure three courses were often necessary. The drug resembled neostibosan as regards tolerance, but it was perhaps less effective. The authors state that ureastibamine is the best tolerated and the most effective of all the antimonials they have used.

The authors have also treated cases with 4–4 diamidino-diphenoxy-pentane [pentamidine]. The dose employed for intramuscular injection was 1·5 to 2 mgm. per kgm. of body weight. Three injections were made each week, the full course comprising 12 to 15 injections. Of 11 cases treated with this drug, four had previously been treated with an antimonial. The drug was well tolerated, though the injections were painful and often led to the appearance of several drops of blood at the puncture wound. The temperature quickly fell to normal, but the spleen was slowly reduced in size. Four of the patients were cured by the use of this drug alone in two to three months, but for the others of the series subsequent antimony treatment was necessary. The authors conclude that pentamidine is a drug of low toxicity liable to cause only local troubles. It is very useful for the commencement of treatment in very young children and in cases with severe forms of the disease. In effectiveness it resembles the antimonials, with the exception of ureastibamine, which, in their opinion, still holds first place. In one case which was resistant to antimonials and to

pentamidine, splenectomy was performed. It seemed that a cure was effected, but some months later death occurred from pneumococcal meningitis.

The present cure rate, based on the last 62 cases treated by the authors, is 85 per cent. *C. M. Wenyon.*

REY, H. **Cellular Reactions in the Dermal Connective Tissue of the Hamster to** *Leishmania brasiliensis*. *J. Infect. Dis.* 1943, Mar.–Apr., v. 72, No. 2, 117–24, 21 figs. on 1 pl. [28 refs.]

The author has studied the local reaction which follows the injection, into the subcutaneous connective tissue of hamsters, of cultures of *Leishmania brasiliensis*. This is of an inflammatory nature indicative of natural immunity. He traces the cellular changes which take place and which lead to the complete destruction of all parasites in 36 hours, as a result either of digestive processes within phagocytic cells or of the action of proteolytic or parasiticidal substances which are present in the connective tissue or are derived from the plasma. The phagocytic cells are chiefly the polyblasts derived from the local macrophages and lymphoid wandering cells and the heterophiles which migrate from the blood by active diapedesis through the walls of the regional capillaries and veins; endothelial cells apparently play no part in this process. The injected flagellates are quickly transformed into leishmania, some of which, after phagocytosis, show signs of multiplication before they are overcome by the intracellular destructive processes.

C. M. Wenyon.

PESCE, H. & PARDO, L. **Notes on Cutaneous Leishmaniasis and** *Phlebotomus* **in the Province of Andahuaylas, Peru.** *Amer. J. Hyg.* 1943, May, v. 37, No. 3, 255–8, 1 map.

Though cutaneous and muco-cutaneous leishmaniasis are known to exist in various parts of Peru there has hitherto been no information regarding the presence or absence of sandflies, which have been reported from all other endemic areas of the disease in the Americas. The authors, having to travel extensively throughout the Province of Andahuaylas, took the opportunity of searching for sandflies. Leishmaniasis in this Province was found in eight areas, in seven of which the cutaneous form alone occurred. The altitude of these areas varied from 900 to 2,500 metres. In only four of the areas was it possible to conduct a search for sandflies and in all four they were found. The sandflies included two undescribed forms which have been named *Phlebotomus pescei* and *P. battistinii* by Dr. Marshall HERTIG; batches from certain areas were lost before they could be identified.

C. M. Wenyon.

HERTIG, M. **Notes on Peruvian Sandflies with Descriptions of** *Phlebotomus battistinii*, **n. sp., and** *P. pescei*, **n. sp.** *Amer. J. Hyg.* 1943, May, v. 37, No. 3, 246–54, 16 figs. on 2 pls.

FEVERS OF THE TYPHUS GROUP.

McConn, C. F. **Observations on a Typhus Epidemic.** *Lancet.* 1943, Oct. 30, 535–7.

The last serious epidemic of typhus fever in the Spiddal area of West Galway was in 1903–04 ; the present outbreak was in September to November 1942. The first two cases were missed, having been regarded as "typical bronchopneumonia." The third case was diagnosed on the operating table while the patient was on the point of being explored for a suspected pelvic abscess. Investigation showed that "influenza" was prevalent in the locality, especially among school children, and several cases were found in which a bluish-red or slaty-blue rash was detected in the epigastric region.

In an area with a total population of 2,222 a selection was made of 535 persons who were suspected of having the disease, or of being contacts, or who were verminous. Of these, 14 were found to have typical attacks of typhus fever with positive Weil-Felix reactions. Of 119 persons with a history of illness during the preceding month 89 had positive reactions with titres ranging from 1–50 to 1–350. Of 110 who had been ill more than one month and less than three months previously, 14 were positive 1–100 ; 7, 1–50 ; and 9, 1–25. Of the 292 who gave no history of illness 16 reacted 1–50, and 3, 1–25. There was only one death during the epidemic ; the total number of cases is not stated. Among the 535 persons investigated, head lice were found in 289 and body lice in 200.

The steps taken to control the epidemic were the establishment of a special hospital for isolation, disinfection, and disinfestation, and the imposition of quarantine on the affected area.

Another outbreak occurred at Carraroe in East Galway ; this was traced to a case that had occurred a month before the disease was suspected ; two persons who had attended the wake of the original patient were attacked. A third outbreak is mentioned ; this occurred at Carna, also in Co. Galway, in 1941. A man died without having been seen by a doctor ; a fortnight later his family were attacked by "influenza" and were looked after by the district nurse who later was attacked by typhus fever.

Weil-Felix tests were carried out later on the seven surviving members of the family ; one was positive, 1–125 ; five were positive, 1–50 ; and one, 1–25.

Control specimens of serum were taken from 51 persons in various unaffected localities in Co. Galway ; only three were positive, at 1–125, 1–50, and 1–25 respectively. The reactor at 1–50 was found to have been previously in contact with a patient in the 1936 outbreak and to be verminous ; the reactor at 1–125 was exceptionally clean and healthy, there was no obvious explanation of the reaction.

John W. D. Megaw.

Stuart-Harris, C. H., Rettie, G. K. C. & Oliver, J. C. **Rickettsial Agglutination Studies in Typhus Fever.** *Lancet.* 1943, Oct. 30, 537–8. [11 refs.]

The results of agglutination tests, carried out on nine persons who had been attacked in the Spiddal outbreak described above, are shown in the table. The Rickettsial suspensions were prepared from

the lungs of mice inoculated by the intranasal route. The murine Rickettsiae were of the Wilmington strain; the two "epidemic" strains were the Breinl and a recent strain isolated by VAN ROOYEN at Cairo in 1942.

TABLE I.

Agglutination of Proteus and Rickettsia by Sera of Irish Convalescents.

Case	Duration of convalescence (months)	Proteus			Rickettsiae		
					Murine	Epidemic	
		OX19	*OX2*	*OXK*		Breinl	Cairo
T.1	3	500	125	50	160	640	640
T.2	3	50	125	50	40	320	160
K.1	4	125	50	50	0(20)	0(40)	0(40)
K.2	5	250	50	25	80	320	160
O'D.1	2	250	25	25	80	80	80
O'D.2	2½	250	125	25	80	320	80
O'D.3	2½	25	25	25	0(20)		0(20)
L.1	2	0(25)	0(25)	0(25)	0(20)	0(40)	40
L.2	2	50	50	50	0(20)	0(40)	80

Figures in parentheses give lowest dilution of serum tested which failed to give agglutination.

On the assumption that *Proteus OX* titres in excess of 1–50 are significant, the positive reactions to *OX19* were five; in two of these and in one other the reaction to *OX2* was positive. Seven sera reacted to the Cairo strain of Rickettsia; two of these were negative to the Breinl and murine strains. Five sera reacted with all three Rickettsial strains; four of these gave stronger reactions with the epidemic than with the murine strain, the other reacted equally with all three.

The results confirm the belief that some, at least, of the patients had been infected by *Rickettsia prowazeki*.

Of sera taken from 45 healthy persons only two agglutinated Rickettsial suspensions of the murine type (at titres of 1–40 and below), none agglutinated epidemic strains.

Sera of guineapigs and rabbits infected with Rickettsiae did not agglutinate *OX19*, but did agglutinate Rickettsial suspensions. Whether the murine or the epidemic strains were used for inoculating the animals there was agglutination for both strains, but the titre was always considerably higher for the infecting strain.

In four human cases the titres were :—

	Day of disease	Murine Rickettsia	Epidemic Rickettsia	*Pr. OX19*
Murine (laboratory infection)	14	640	320	40
Murine (Middle East) ...	21	2,560	640	2,500
Epidemic (laboratory infection)	12	80	640	50
Epidemic (Middle East)	24	1,280	10,240	5,000

The patients with laboratory infections had been immunized with epidemic-typhus vaccine.

These findings are regarded as giving presumptive evidence that human cases of typhus can be classified as murine or epidemic by Rickettsial agglutination tests. *John W. D. Megaw.*

STEUER, W. Ueber die serologische Diagnose und Schnelldiagnose bei Infektionskrankheiten. [**Serological Diagnosis and Rapid Diagnosis in Infectious Diseases.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, June 10, v. 103, No. 2, 137–50.

This article deals chiefly with the "dry-blood agglutination test" of KUDICKE and STEUER. This test, which has been widely adopted in Germany, is claimed to have proved a valuable method of rapid diagnosis, especially in connexion with the detection of typhus in suspected communities. WOHLRAB has claimed that it gives a positive finding one or two days earlier than the Weil-Felix reaction. In one quarantine post 29 cases of typhus were detected within two months; many of these could not have been detected by clinical examination, and 25 per cent. of them gave negative reactions with the Weil-Felix test. One expert describes the test as an "excellent and quite indispensable method."

It is subject to the same general limitations as the Weil-Felix and other agglutination reactions, especially in the matter of the activity of the bacterial suspensions and in the occurrence of misleading results. In spite of a large number of possible fallacies the Weil-Felix test remains firmly established as a valuable diagnostic aid, especially in the numerous cases in which the clinical symptoms are not characteristic. In one institute the Weil-Felix reaction was carried out in large numbers of cases other than typhus; about 10 per cent. of these cases reacted at 1–50; 4·5 per cent. at 1–100; and only 0·4 per cent. at 1–200 or over. In two cases of icterus a titre of 1–6,400 was observed, and in another a titre of 1–800. In one case of dysentery and one of intestinal tuberculosis the titre was 1–3,200. In all these cases of high-titre reaction the non-specific agglutination was probably due to the presence of Proteus organisms in the intestine.

The standard of diagnostic accuracy is higher than that of the Widal reaction. In typhus and typhoid fevers complications arise from protective inoculation. Agglutination tests are not satisfactory in the case of dysentery due to Flexner organisms; in these the reaction is often weak or negative, and false positives are common in healthy persons. Shiga-Kruse bacilli are much more specific in their reactions; titres of 1–200 or over are observed in most cases during the second to the fourth weeks. Agglutination tests are seldom helpful in infections caused by the Kruse-Sonne bacilli. In undulant fever and tularaemia agglutinins are produced with considerable regularity.

In all these diseases the dry-blood test is very useful because it gives an immediate reply to the question of diagnosis. Except in the case of Proteus organisms, killed suspensions are employed. Sera whose Weil-Felix titres are lower than 1–100 or 1–200 do not react to the dry-blood test, but those giving high, and therefore significant, titres are uniformly positive. The skin must be freed from traces of antiseptic before the blood sample is taken, and the blood must flow without pressure. Each droplet should be spread so as to cover a circular area of 1 cm. in diameter, and no heat should be used in drying. If the

bacterial suspension has been kept in the refrigerator it must be allowed to reach room temperature before being used. The blood film must not be scratched during or after the application of the suspension.

The problem of obtaining formol-killed suspensions with good keeping qualities has still to be solved. Bacterial cultures spread on smooth firm strips of filter paper and dried at once can be kept in stock and used as required for making suspensions. Specific agglutinating sera can also be kept in the dried condition on strips of filter paper and used for testing the activity of suspensions. [See also this *Bulletin*, 1942, v. 39, 372; 1943, v. 40, 529, 600.] *John W. D. Megaw.*

GAASE. Untersuchungen ueber die Thermostabilität der Fleckfieber-agglutinine gegen Proteus OX_{19}-Bazillen. [**Investigation into the Thermostability of Typhus Agglutinins against** *Proteus OX19.*] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, June 10, v. 103, No. 2, 154–60.

Sera whose titres of agglutination for *Proteus OX19* were known were heated for half an hour at different temperatures and again tested. Heating to 56°C. did not affect the titre in 67 per cent. of the cases; in the others the titre was lowered but the reaction remained positive. Heating to 60°C. abolished the reaction in 60 per cent. of the cases, and caused a great reduction in the titres of most of the others. Heating to 65°C. caused almost complete inhibition of the reaction, and a temperature of 70°C. abolished the reaction in all cases.

A further experiment was carried out to determine the degree to which each of the factors concerned in agglutination was affected by heating. These factors are :—(*a*) the haptophore group or agglutinoid which combines with the bacterial antigen and renders it inactive, but does not cause agglutination of the bacteria, and (*b*) the more thermolabile zymophore or agglutinophore group which causes clumping.

When an agglutinating serum is heated to a temperature which destroys group (*b*) without damaging group (*a*) and afterwards mixed with agglutinable bacteria, no agglutination occurs but the bacterial antigen becomes fixed so that the organisms cease to be agglutinable by the addition of the original unheated serum. If the serum is heated to a temperature at which both groups are destroyed there is no clumping, but if fresh unheated serum is added clumping occurs at the original titre.

In the present experiments 29 sera of known agglutination titres were heated to 60°C. for half a minute. In two cases the titre remained the same; in 11 it was lowered, usually to a great extent; in 16 the reaction became completely negative. The addition of the corresponding unheated serum to each of the samples under test caused full restoration of the agglutination titres in 17 cases; partial restoration in four; and no restoration in eight. The eight that remained negative belonged to the group of 15 in which the reaction with heated serum had become negative. In the conditions of the experiments the agglutinophore group was inactivated by heat more often than the haptophore group which, in the 15 cases in which agglutination was completely inhibited by heating, persisted in eight of the sera.

If Rickettsiae should be found to behave in the same way as *Proteus OX19* there would be additional evidence of the specificity of the Weil-Felix reaction. *John W. D. Megaw.*

MEYER, R. Die OX_{19}-Agglutination bei Fleckfieberschutzgeimpften und ihre Bedeutung für die Fleckfieberdiagnose. [**The Agglutination of *Proteus OX19* after Typhus Inoculation; its Significance in Diagnosis.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, July 5, v. 103, No. 3, 165–9.

Of 312 persons inoculated with Weigl's vaccine, and tested at varying intervals afterwards, only two agglutinated *Proteus OX19* at titres in excess of 1–50. One of these reacted at 1–100; and the second, who had had an attack of typhus fever three months previously in spite of inoculation, reacted at 1–400. Three other persons who had typhus after inoculation, and three months or more before being tested, reacted at 1–50 only.

The number of weakly positive reactions after inoculation tended to increase up to three months, and after seven months it usually declined, though after as long as 16 months the reaction might be ± – – – – 1–50, whereas 14 days after inoculation it was usually + 1–50.

Little difference was noticed between the reactions following first, and those following second, courses of inoculation.

Twenty persons whose post-inoculation reactions varied from ± 1–50 to ± – – – – 1–50 were given intramuscular injections of "omnadin," which have been found to produce amnestic reactions similar to those due to febrile attacks. Four days later, 16 of these reacted ± 1–100 to + 1–100, and two reacted ± 1–200.

It was concluded that inoculated persons may have Weil-Felix reactions in titres up to 1–200 in fevers other than typhus.

John W. D. Megaw.

MEYER, R. Erfahrungen bei der behelfsmässigen Zubereitung von Rekonvaleszentenserum. [**Experiences in the Improvised Preparation of Convalescent Sera (for the Treatment of Typhus).**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, July 5, v. 103, No. 3, 169–74.

In 94 typhus patients treated with doses of 125 cc. of convalescent serum, given intravenously on the second or third day, the fatality rate was 6·4 per cent., against 14·7 per cent. in the control group. Cases in which the agglutination titre was less than 1–800 were excluded from consideration, and no mention is made of the manner of selection of the controls except that they belonged to the same age groups as the test cases. The author points out that the figures do not provide statistical proof of the efficacy of the treatment.

There were 464 donors, from each of whom 200 to 400 cc. of blood were taken, usually on the 14th to the 16th day after the end of the fever. The blood of compatible groups was mixed; small amounts of residual agglutinins for red blood corpuscles could be ignored, in view of the fact that the blood of the recipient could neutralize many times the amount contained in 125 cc. of serum.

The blood mixture was kept at room temperature; this was 2° to 6°C. during the early stages of the tests. The serum was drawn off and passed through a Seitz-EK filter of a type that could be sterilized by a current of steam. The front plate, which was liable to escape sterilization by this means, was first heated with a blow-lamp. Serum

separated by standing in the cold contained a little haemoglobin and tended to become turbid and flocculent after a few weeks.

When the room temperature rose to 12°C., the addition of phenol to the serum was contemplated, but it was found by experiments on healthy persons that normal serum with the addition of 0·4 to 0·5 per cent. phenol caused unpleasant reactions when given in the requisite doses; smaller quantities of phenol were found to be inadequate. A high-efficiency centrifuge was, therefore, necessary when low temperatures were not available, in order to obtain the serum quickly and so avoid undue multiplication of bacteria.

Each flask of serum, containing 250 cc., was tested for sterility by aerobic and anaerobic cultures observed over a period of eight days.

John W. D. Megaw.

DING, E. Ueber die Schutzwirkung verschiedener Fleckfieberimpfstoffe beim Menschen und den Fleckfieberverlauf nach Schutzimpfung. [**The Protective Effect in Man of various Typhus Vaccines, and their Influence on the Course of the Disease.**] *Ztschr. f. Hyg. u. Infektionskr.* 1943, June 18, v. 124, No. 6, 670–82, 2 figs. [17 refs.]

During the three winters, 1940 to 1943, comparative investigations were carried out in groups of patients suffering from typhus who had been vaccinated six to eight weeks previously by six types of vaccine, and in two control groups. A summary of the findings is given in the table.

The number of persons in each group is not stated, but is said to have been approximately the same in all. The conditions were comparable except that the average age of the vaccinated was 33·2 years, and of the controls 31·2.

All the symptoms were, on the average, much more severe in the controls, especially those associated with the nervous system. There was no evidence that vaccination had any influence in preventing attacks. The yolk-sac vaccines made of mixtures of *R. prowazeki* and *R. mooseri* were considered to give less good protection than those made of *R. prowazeki* alone, and they are no longer in use.

[This paper supplies convincing evidence of the efficacy of killed vaccines of the Cox and other types in preventing death from typhus fever.

It is likely to attract attention in circles outside the medical profession because of internal evidence which points to remarkable conditions connected with the investigation. An editorial article in the *Lancet* (1943, Dec. 18, p. 770) entitled *Typhus Vaccines—A Crucial Experiment*, contains the following comments:—The author describes himself as a storm-troop leader; the percentage figures show that each group must have comprised a large number of persons (an incidence of complications of 0·5 per cent. suggests at least 200 in one group); the day of infection must have been known in each case; and the incubation period was much shorter than is accepted for typhus acquired in natural conditions.

The articles concludes, "Thus, it seems that particularly heavy infections occurred in some hundreds of persons on known days during the investigations of a storm-troop leader. We leave our readers to make their own deductions."]

	Reactions after each dose (percentage)			Incubation period in days		Duration of fever		Complications (per cent.)	Deaths
				Average	Range	Average	Range		
1. Weigl's Vaccine	94	86	96	6–7	4–11	11	6–16	0	0
2. Cox type (*R. prowazeki*)	50	44	50	6–7	2–11	10	5–13	0	0
3. Yoll-sac (*R. prowazeki* and *R. mooseri*)	32	96	36	6–7	2–9	12	7–17	0·5	1
4. Ditto (strong)	36	50	40	6–7	2–9	12	8–16	3	1
5. Ground type (rabbit lung)	20	40	30	6–7	2–11	10	6–14	0	0
6. Combiesco type (dog lung)	15	25	40	4–5	2–9	12	6–15	2·1	0
Control A				2–3	2–5	17	11–20	11	33·3 per cent.
Control B				2–3	2–11	18	12–18	11	20 per cent.

John W. D. Megaw.

LOPEZ SORIANO, P. Notas sobre cien vacunaciones con vacuna viva de Blanc en la prision de Tanger. [**Notes on One Hundred Vaccinations with Blanc's Living Vaccine in Tangier Gaol.**] *Med. Colonial.* Madrid. 1943. Oct. 1. v. 2. No. 4. 273–9. 1 chart.

Vaccine obtained from "the Pasteur Institute" [see this *Bulletin*, 1937, v. 34, 486] and administered strictly in accordance with the directions was injected into 9 Jewish, 7 non-Jewish European and 84 Mohammedan prisoners in June 1942.

The chief reactions observed were :—

1) Slight fever in four, and headache in four others after five to six hours.

2) Slight fever, lasting about two days from the second day in 16, of whom two were Jews and one was a European.

3) Fever with a maximum temperature of 38° to 38·5°C., lasting two days from about the 12th day, in six persons, of whom five were Jews and one a Mohammedan.

4) Severe "experimental typhus," in which the temperature appears to have risen to 40°C. and the duration to have been about 11 or 12 days, occurred about the 21st to the 23rd day in six persons, all of them Jews, including two who had both of the earlier reactions. In two of these the rash and symptoms were those of typical classical typhus.

Only two of the vaccinated persons had a positive Weil-Felix reaction six weeks after inoculation, both of these were Europeans, and the titre was 1–50.

Seven months later there was a limited outbreak of typhus fever in the gaol, in which five of the vaccinated persons were attacked.

Among 10 vaccinated persons still in the gaol at this time only two gave positive Weil-Felix reactions, 1–100 and 1–200 respectively. These reactions may have been due to "inapparent" attacks.

The reason for the occurrence of six post-vaccinal attacks of typhus in nine vaccinated Jews and the complete absence of such attacks in 84 Mohammedans is not clear, but the question remains of the possible influence of vaccinated persons in transmitting infection and of transmuting the type of the *Rickettsia* from murine to classical. So far as the evidence goes it is considered essential in Tangier to restrict the vaccine to Mohammedans, and to administer it in strictly controlled conditions so as to obtain further light on the supposed harmlessness of the procedure.

John W. D. Megaw.

PATEL, J. C. **Typhus Fever in Bombay.** *Indian Physician.* 1943, Sept., v. 2, No. 9, 317–19. Discussion 320–22.

Six cases of fever with sudden onset, a duration of 8 to 14 days, and termination by lysis occurred in Bombay between February and May 1943, in patients on whom lice could not be found.

In five the reaction to *Proteus OX19* was positive at titres of 1–500 to 1–1,000; in one of these the reaction to *OX2* was positive, 1–1,000, and in another it was positive 1–500. In all five the reaction to *OXK* was negative, but in the sixth patient, who was negative to *OX19* and *OX2*, the reaction to *OXK* was positive, 1–1,500. No rash was seen.

The rat flea may have been the vector, and clinically the cases are regarded by the author as "typical tropical typhus."

In the discussion of this paper N. D. PATEL referred to a case reported by himself in 1942 in which the reaction to *OX19* and *OXK* was positive on the 8th and 15th days at a titre of 1–1,000 ; there was a polymorphic rash—morbilliform, petechial, papular and vesicular, later becoming pustular ; this rash was probably modified by large doses of quinine and sulphanilamide which had been given by the physician in charge. Dr. Patel also mentioned 13 cases of typhus reported from the Combined Military Hospital at Colaba, Bombay, in 1941 and 1942. Lice or ticks were suspected of being the vectors.

John W. D. Megaw.

RUBENSTEIN, A. D. & ROWLEY, H. F. **Endemic Rocky Mountain Spotted Fever in Massachusetts.** *New England J. of Med.* 1943. Sept. 16, v. 229, No. 12, 455–61, 2 figs. [35 refs.]

Only five cases of Rocky Mountain spotted fever have been reported from Massachusetts ; these occurred in an area of 59 square miles during 1937 and 1939. This paper contains an account of two of the cases. From one of them Rickettsiae were isolated ; these were of low virulence for guineapigs, of which only 30 per cent. showed scrotal swelling. The patient had prolonged high fever for three months, and then irregular fever for two and a half months, and was comatose for three months. There were areas of sloughing of the skin of the legs followed by scar formation, and intermittent attacks of pulmonary oedema. Mental recovery was very slow ; apparently it was not complete till three years after the attack.

[In view of the current use of the name endemic typhus for the flea-borne typhus of North America it would have been preferable to give this article the title, "Rocky Mountain spotted fever, endemic in Massachusetts."]

John W. D. Megaw.

BERNSDORF, W. Grundsätzliche Gedanken zum Wolhynischem Fieber. [**A General Discussion on Trench Fever.**] *Deut. Militärarzt.* 1943. May, v. 8, No. 5, 254–8.

In this breezy article the author gives his general impressions of trench fever ; these are based on personal experience of the disease at a large hospital in the middle sector of the Eastern Front and on views expressed by colleagues from other parts of the front.

Till February 1942 the disease had been regarded as a potential threat only ; then suddenly it became a serious preoccupation for physicians and surgeons alike. Hospital services were gravely embarrassed and the disease caused unfitness for duty in many of the patients for as much as two or three months. The difficulties of the medical staff were aggravated by the absence of any diagnostic criterion, effective treatment, or previous experience of the disease. The text-book descriptions were not helpful, they were even misleading because of the emphasis they laid on the classical type of the disease.

The early cases in the present war were usually mistaken for anomalous typhus fever or a new disease, and it was only in February 1942 that the true nature of the condition was recognized. Even then mistakes were frequent ; other diseases were often diagnosed as trench fever and many cases of trench fever were missed.

Among the types of the disease observed were the following :—

(1) The classical five-day type, with short paroxysms of fever recurring every four to six days. This was by no means common.

(2) The irregular recurring type, with similar paroxysms recurring at intervals varying from one to ten days.

(3) The undulant type, with regular or irregular recurrences of waves of fever.

(4) Atypical forms, with spells of fever lasting several days, followed by one or more recurrences at varying intervals.

(5) Afebrile types, in which recurring bouts of pain in various parts of the body replaced the spells of fever ; the periodicity of the pains was as irregular as that of the fever.

(6) The "vegetative-dystonic" type, in which disturbances of the sympathetic nervous system predominated and caused vasomotor disorders such as symptoms of angina, asthma, abdominal pain, urticaria, etc.

(7) A mixed type, in which the disease during its course changed from any one to any other of the above types. The most frequent combination was one of the first four types followed by either type 5 or type 6.

The only consistent feature was the pronounced tendency to recurrence, though sometimes this was seen at only one stage of the illness, and sometimes there was only one recurrence.

Shin-bone pains were altogether absent in some cases, in others they occurred at only one stage. Similar pains have been observed in typhus fever, malaria, influenza, periostitis and other diseases, so that they are not diagnostic. The Weil-Felix reaction is stated, though with some reserve, to be negative in trench fever. The diagnosis must often be made by exclusion of such diseases as malaria, relapsing fever, lymphogranuloma, typhus, typhoid, paratyphoid, undulant fever, dengue, and influenza.

No treatment was found to have any effect on the course of the disease which always ends in recovery.

The author asks two questions : (1) Has the louse been conclusively proved to be the vector ? and (2) Is *Rickettsia quintana* the only causal agent ? He argues that *prima facie* a Rickettsia is not likely to cause a disease with a pronounced tendency to recurrence.

John W. D. Megaw.

REIMER, K. Neue Erfahrungen bei Wolhynischem Fieber im Sommer 1942. [**New Observations on Trench Fever in the Summer of 1942.**] *Deut. med. Woch.* 1943, July 9, v. 69, No. 27–28, 508–11, 4 figs.

This deals with 95 cases of trench fever seen in the summer of 1942. In several cases in which the incubation period could be determined with accuracy it was at least 13 days. Body lice were found on nearly all the patients ; head lice were never seen. Bed-bugs could be excluded with reasonable certainty.

The diagnosis is still based on symptoms, no practicable agglutination or precipitation test has been discovered. The rhythmical recurrence of the fever, and the pains in the limbs, especially the shin-bone pains, are the special diagnostic points. Prodromal lassitude and vague pains occurred in 19 of the cases. The onset was with chill in 20 cases, rigors were never observed. Fever with a periodicity of about five days occurred in 55 per cent. of the cases ; the fever was usually in short

paroxysms, but sometimes the spells lasted two to four days. The undulant-recurring type of fever was seen in 35 per cent. of the cases. The " typhoid " type was also seen, this might be preceded or followed by the recurring types. The number of spells of fever ranged between two and seven. The total duration was 13 to 49 days, the average period of hospital treatment was 24 days. Convalescence was slow in about half of the cases, there were no deaths.

In 70 per cent. of the cases the patients described the pains as " shin-bone," in these the tibia was tender on pressure. The pains came with, or before, the rise of temperature. The headache was severe in 45 cases, eight of the patients complained of giddiness. There was a scanty roseolar rash in 16 cases, in two of these there were a few petechiae. The spleen was enlarged in six cases, the liver in none. The leucocytes were increased, sometimes to 16,000; a temporary leucopenia was seen in two patients. Döhle inclusion bodies were never seen in the leucocytes, though these were always present in the author's cases of typhus. The eosinophile count was normal.

Respiratory-tract complications were frequent, probably because of the wet weather; there was bronchitis in 36 cases and broncho-pneumonia occurred in two of these. There was gastro-intestinal catarrh in 39 cases. *John W. D. Megaw.*

SKUJA, N. Gastrointestinale Symptome bei Febris Wolhynica. [**Gastro-intestinal Symptoms in Trench Fever.**] *Wien. klin. Woch.* 1943, July 2, v. 56, No. 25/26, 412–13, 4 figs.

In a war hospital for diseases of the bowel, 22 (about 4 per cent.) of the cases treated since April 1942 had recurring febrile attacks which could only be accounted for as being due to trench fever. The periodicity ranged between three and seven days. Neuritic and rheumatic symptoms were not pronounced; the chief features were headache, weakness, sweating, and gastro-intestinal disturbances. There was abdominal pain in most cases, but sometimes vomiting and diarrhoea occurred.

Cases of trench fever in which such symptoms predominate are likely to be missed when characteristic febrile paroxysms are absent. Auto-haemotherapy combined with sulphapyridine is the system of treatment recommended by the author. *John W. D. Megaw.*

YELLOW FEVER.

KIRK, R. **Some Observations on the Study and Control of Yellow Fever in Africa, with particular reference to the Anglo-Egyptian Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943, Sept., v. 37, No. 2, 125–50, 2 maps. [35 refs.]

A valuable summary of the subject which should be read in its entirety by those interested in the study of yellow fever in Africa. The author deals with the distribution and epidemiology of the disease and factors influencing its control and then discusses his own experiences in the Nuba Mountains [see this *Bulletin*, 1942, v. 39, 69] and the possible spread of yellow fever in Africa.

It is evident that in Africa differences in meteorological conditions or density of population, the geographical distribution of *Aëdes aegypti*, and public health measures, all seem to have played no important part in confining the disease to its present distribution. It is known that more than 40 species of mosquitoes can transmit the virus in the laboratory, and in certain places vectors other than *A. aegypti* have been shown to be concerned in the natural spread of the disease. Also the fact that the disease can persist in sparsely populated regions has led to the discovery that 20 to 25 per cent. of wild monkeys in Africa and South America have immune bodies against yellow fever virus in their blood.

With regard to the control of outbreaks in the Nuba Mountains it is considered that accurate knowledge of local communications and of local geographical, climatic and social conditions, was probably more useful than detailed information on the bionomics of all the possible vectors in the neighbourhood, had this been available. The virus may be present in places where there is no evidence of active disease and yet with almost the whole population immune. It is a wise precaution, therefore, in relation to quarantine regulations, to consider the entire endemic region in Africa as potentially infective. Within the endemic area rural outbreaks may constitute a serious public health problem, as in the case of the Nuba Mountains epidemic. It is also suggested that yellow fever may spread by the gradual extension of the present endemic area, in the absence, to begin with, of any noticeable epidemics of recognized cases. For this reason it is desirable that the boundaries of the present endemic region should be accurately delimited, so that any subsequent changes can be recognized.

E. Hindle.

FINDLAY, G. M. & COCKBURN, T. A. **Possible Role of Birds in the Maintenance of Yellow Fever in West Africa.** [Correspondence.] *Nature.* 1943, Aug. 28, 245.

Immune bodies to the yellow fever virus have previously been found in the blood of monkeys of the yellow fever endemic zone of Africa, and in that of cattle, sheep, dogs, pigs and a camel. Some of the domestic animals, however, were from areas in which the disease is not known to exist, and the significance of the findings awaits further study [see this *Bulletin*, 1938, v. 35, 110, 125].

Although the evidence suggests that monkeys are hosts for the yellow fever virus, the monkey population is not large, and there is no evidence that monkeys migrate over great distances. Search was therefore made for virucidal bodies in other animals and in birds, from the Gold Coast, where single sporadic human cases are found. Virucidal bodies to yellow fever virus were found in one rodent (*Thryonomys swinderianus*) of five examined, but the sera of civet cats, giant rats, bush-tailed porcupines and royal pythons were negative. Forty wild birds were examined, and virucidal bodies to yellow fever virus were found in a buffbacked heron (*Bubulcus ibis ibis*), an African barn-owl (*Tyto alba affinis*) and a Senegal kingfisher (*Halcyon senegalensis senegalensis*). Further work on the significance of these findings is proceeding. If it should be proved that the virucidal action is a result of the development of immune bodies upon previous infection with the yellow fever virus, these findings may throw light on the maintenance of the disease.

The authors recall that in America birds appear to be important in the maintenance of eastern and western strains of equine encephalomyelitis virus. *Charles Wilcocks.*

KUMM, H. W. & CRAWFORD, P. J. **The Recent Distribution of Endemic Yellow Fever in Central America and Neighboring Countries.** *Amer. J. Trop. Med.* 1943, July, v. 23, No. 4, 421–31, 4 maps. [18 refs.]

A record of intraperitoneal mouse protection tests carried out on 4,047 samples of human blood collected in 85 localities ranging from Southern Mexico through Central America to Colombia. These specimens were not taken in large cities and towns, but in rural and jungle areas in order to detect the possible existence of jungle yellow fever. The results are of considerable interest since they show that in these regions, during recent years, endemic yellow fever has been restricted to Eastern Panama, where it approaches to within 50 miles of the Canal Zone. In ten localities in Panama persons born in years ranging from 1926 to 1935, and in four localities in Colombia some born in 1928 and 1929, gave positive protection tests. *E. Hindle.*

LAEMMERT, H. W., Jr. & MOUSSATCHÉ, H. **Adaptation of Yellow Fever Virus to Young Chickens by Serial Brain to Brain Passages.** *J. Infect. Dis.* 1943, May–June, v. 72, No. 3, 228–31.

The ordinary Asibi strain of monkey passage yellow fever virus could not be established in young chicks by intracerebral inoculations, but a strain which had undergone 19 passages in tissue culture of the Maitland type and subsequently 22 passages in developing fowl embryos was readily established in young chicks, and was passaged 102 times by direct brain-to-brain transfers. Young chicks inoculated with this virus never showed any signs of encephalitis. Virus was demonstrable in the circulating blood of these chicks from two to six days after intracerebral inoculation, and in the brain for as long as 14 days. In the majority of cases neutralizing antibodies appeared in the blood.

During the course of the passages in chicks, the virus lost its power to produce a fatal infection in rhesus monkeys inoculated subcutaneously, but when inoculated intracerebrally these animals developed fatal encephalitis. Although this strain of virus had lost its viscerotropism for rhesus monkeys the incubation period in mice after intracerebral inoculation was not shortened. *E. Hindle.*

FOX, J. P., KOSSOBUDZKI, S. L. & DA CUNHA, J. F. **Field Studies on the Immune Response to 17D Yellow Fever Virus. Relation to Virus Substrain, Dose, and Route of Inoculation.** *Amer. J. Hyg.* 1943, Sept., v. 38, No. 2, 113–38. [18 refs.]

A study of the evolution of vaccination against yellow fever with the 17D strain of attenuated yellow fever virus and of the Brazilian experience in the production and application of vaccine containing this virus strain.

Details are given of the technique of vaccine preparation from four substrains of virus 17D and of the method of determining the antibody

content of sera. The authors then describe the results of three large-scale experiments undertaken to study certain problems in the in-immunization of human subjects.

In the first experiment at Belo Horizonte, Minas Gerais, 814 Brazilian soldiers were vaccinated in order to study the antigenicity of four substrains of virus 17D. Of these soldiers 264 were found to be immune to yellow fever before vaccination, leaving 550 non-immunes. The substrains were found to be of closely similar antigenic character, but minor differences in the degree of immune response suggested that substrain 17D–NY104 and substrain EP were slightly more antigenic. "Three of these substrains *17D*$_3$, *17DD low* and *17D–NY 104* have been maintained primarily in tissue cultures prepared according to original technique [see this *Bulletin*, 1936, v. 33, 623], while the fourth, *substrain EP*, has been maintained in serial embryo passage."

There was also evidence that small virus doses might give a better immune response than large doses. However, the routine vaccination dose should not contain less than 500 minimum infective doses for mice, in order to immunize a satisfactory percentage of persons vaccinated.

A second experiment at Pouso Alegre, Minas Gerais, was conducted to determine the influence of various dilutions of the vaccine. Fifteen vaccine lots prepared under the seed-lot system were found to be of uniform antigenicity, and it was also established that serum-free vaccine could be safely applied, when the virus content permits, in saline dilutions as high as 1 in 100, since of 918 vaccinated persons who were examined all became immune. Finally, evidence was obtained that the immune response to 17D virus, in individuals up to 14 years old, is directly related to age, the average protective capacity of the sera increasing with the age of the donor.

The third experiment at Silvianopolis, Minas Gerais, was carried out with the object of determining the most satisfactory method of inoculation of the virus. Evidence was obtained that human susceptibility to intradermal or intramuscular inoculations of virus substrain 17D–NY104 is greater than to virus inoculated subcutaneously. However, the immediate immune response and the level of immunity after one year were found to be similar after all three methods of inoculation. Accordingly any differences in susceptibility are not considered sufficient to outweigh the technical advantages of the subcutaneous route.

A considerable discrepancy was found between the safe immunizing doses of the first and third experiments, in the latter the minimum dose being very much smaller than in the first experiment. Thus in the Silvianopolis experiment all but two of 109 persons who received from 9·2 to 46 m.i.d. for mice, and all of 107 who received 147 m.i.d. or more, became immune. On the other hand, in the Belo Horizonte experiment, out of 106 persons receiving from 47 to 92 m.i.d., 34 failed to become immune. This discrepancy is not fully understood, but it is suggested that very low-level immunity may have existed among the soldiers at Belo Horizonte and inhibited the response to small virus doses. Pending further study the larger dose is recommended.

The author's results, supported by numerous tables, broaden the experimental basis for the use of 17D virus in vaccinating against yellow fever, and indicate that when the necessary conditions have been met, it gives very satisfactory results. *E. Hindle.*

Fox, J. P. & Penna, H. A. **Behavior of 17D Yellow Fever Virus in Rhesus Monkeys. Relation to Substrain, Dose, and Neural or Extraneural Inoculation.** *Amer. J. Hyg.* 1943, Sept., v. 38, No. 2, 152–72, 4 figs. [24 refs.]

A detailed account of observations made upon 477 *rhesus* monkeys inoculated intracerebrally in the routine control of individual lots of vaccine, with special reference to the substrain and dose of the 17D virus inoculated.

The data for eight groups of monkeys inoculated with different substrains of 17D virus reveal significant differences in the occurrence of circulating virus, in the immune response, in the onset and duration of febrile reactions, and in the incidence of encephalitic manifestations. These differences can be correlated to some extent with similar reactions in man.

The quantity of virus in the intracerebral inoculum was found to be related to the occurrence of circulating virus, the onset and duration of the febrile reaction, and to the time of appearance of antibodies in the serum. In general, larger inocula are followed by an earlier appearance of circulating virus, of serum antibodies, and of febrile reaction, usually however of shorter average duration.

A relation was shown between the virus dose and the immune reponse in monkeys inoculated subcutaneously. With the largest dose circulating virus was almost suppressed and serum antibodies could be demonstrated by the seventh day. With the smallest dose, virus did not appear in the blood until the sixth or seventh day and serum antibodies not until after the 11th day, although the subsequent titres were higher than those following larger inocula.

Inoculation by the intracerebral route was followed by more abundant circulating virus and also by a higher average level of antibodies in the serum. *E. Hindle.*

Fróes, H. P. Estudo clínico da febre amarela. [**Clinical Study of Yellow Fever.**] *Bol. Oficina Sanitaria Panamericana.* 1943, June, v. 22, No. 6, 490–94. English summary.

Though this paper contains nothing new it serves a useful purpose in calling attention, aphoristically, to the main features of yellow fever and thus enabling an early diagnosis to be made and measures of prevention to be timely undertaken. The author notes the clinical types of the disease from the mild inapparent to the fulminating, the course of a typical case, its diagnosis from malaria, typhus (especially the South American form), pneumonia, acute colecystitis, dengue, Weil's disease and acute yellow atrophy of the liver ; the symptoms warranting a bad prognosis—rapid evolution, early and marked jaundice, oliguria, uraemia, severe and repeated haemorrhages—and those of good augury—low temperature, especially in the second period, haemorrhages slight or absent, blood changes, increase of leucocytes, relative increase of neutrophiles and diminution of lymphocytes.

Of great importance in early, mild, or atypical cases is to bear in mind the possibility of the existence of yellow fever. The death-rate varies, of course, with the severity of an outbreak but it is, generally speaking, lower than is commonly believed ; it is rarely in modern times higher than 20 per cent., although there is no specific treatment known as yet. *H. Harold Scott.*

LANE, J. & CERQUEIRA, N. L. **Os Sabetíneos da América (Diptera, Culicidae).**

This book is reviewed on p. 155.

SANDFLY FEVER.

CULLINAN, E. R. & WHITTAKER, S. R. F. **Outbreak of Sandfly Fever in Two General Hospitals in the Middle East.** *Brit. Med. J.* 1943, Oct. 30, 543–5, 4 charts.

An epidemic of sandfly fever occurred in two adjoining general hospitals in the Middle East. In hospital A there were eight attacks among 30 medical officers; 20 among 80 nursing sisters; and 282 in 240 "other ranks." Several of the other ranks had two or more attacks. Between August 27th and September 10th more than 70 men were in hospital, and on one day there were 87 sick. The epidemic lasted throughout the three months, August to October 1942. During this time 1,910 patients were admitted and 365 of these were attacked after admission.

Most of the cases occurred in wards whose surroundings were littered with stone and rubble from recent building operations; wards not far away, with tidy surroundings, had relatively few cases. Stone-built and tented wards were equally affected. In the adjoining hospital B, the officers and sisters were attacked in about the same proportions; there were 171 admissions from an average strength of 210 other ranks, but about 30 more were treated in their quarters. This hospital did not begin to receive patients till the beginning of September.

The clinical picture corresponded closely with the classical type; the fever usually lasted three to four days, the extremes being one and eight days. The temperature had usually risen to 102° or 103°F. by the time that the patient reported sick. Many of the patients looked, and felt, very ill; in a few cases there was agonizing photophobia. A short secondary rise of temperature was observed in about 10 per cent. of the cases. The usual period of unfitness for duty was from 7 to 12 days. Second attacks, from 2 to 12 weeks after the first, occurred in 15 per cent. of the subjects; occasionally there were three separate attacks during the three months. These later attacks were obviously due to reinfections so that the immunity must have been short-lived. No Aëdes mosquitoes were seen; sandfly infestation was heavy. Attempts at control were regarded as having had little effect. In addition to strict antimalarial operations, the tents and huts of hospital A were "flitted" thrice daily from early in September, and sandfly nets were used. It was found impossible to deal with the breeding grounds of the sandflies.

The epidemic eased abruptly at the end of October.

[This epidemic shows clearly that sandfly fever can be an important war disease. The failure to control infection may not have been so complete as is suggested; with conditions eminently favourable for transmission, there might well have been more cases among the patients of hospital A if no effort had been made to prevent the spread of infection. The frequent occurrence of a two-phase type of temperature, and the short duration of immunity, are noteworthy points.]

John W. D. Megaw.

FERGUSON, R. L. **Sandfly Fever and the Rheumatic Series.** *Brit. Med. J.* 1943, Oct. 30, 545–6, 3 figs.

Three cases of short fever occurred almost simultaneously in a ship at a Sicilian port in August ; sandflies were abundant.

Two of the cases were diagnosed as sandfly fever ; in the third the symptoms were rather similar, but there was a soft presystolic murmur during the fever and there was a history of an attack of rheumatic fever 11 years previously, followed by almost yearly attacks of fever similar to the one now recorded. A provisional diagnosis of pyrexia of rheumatic origin was made. Blood films were examined, but no mention is made of the leucocyte picture. The absence of severe gastro-intestinal symptoms at any stage of the fever in the three cases was thought by the author to be a point against the diagnosis of sandfly fever [but few observers would hesitate to make the diagnosis because of the absence of these symptoms]. *John W. D. Megaw.*

SCHULTEN, H. & BROGLIE. Ueber das russische Kopfschmerzfieber. (Eine neuartige Infektionskrankheit mit meningealen Reizerscheinumgen.) [**Russian Headache Fever.**] *Münch. med. Woch.* 1943, June 18, v. 90, No. 24/25, 369–71, 6 charts.

The description of this fever, which is claimed to be new, is based on personal knowledge of about 100 cases in " the Middle East." The disease was first seen in August 1942 ; it declined sharply with the onset of the cold weather.

The chief features were : sudden onset with chill ; duration " 3 to 5 to 7 " days, usually 5 days ; termination by lysis ; the frequent occurrence of a two-phase type of fever curve ; the pulse rate normal or slightly increased ; very slight leucocytosis or moderate leucopenia ; very severe headache, frontal or post-orbital ; pain on movement of eyeballs ; slight stiffness of the back of the neck, and positive Kernig sign, were usual ; the cerebrospinal fluid was often under increased pressure, its cell count was normal or showed a slight increase. There were no catarrhal signs, no deaths, and no dangerous symptoms. The bacteriological and serological findings were negative ; these, with the two-phase type of fever curve, suggested a virus disease.

The differential diagnosis is discussed and the statement is made that sandfly fever can be excluded by the severity of the headache, the duration of the fever, and the persistence of the disease in cool weather.

The semblance of the disease to the " pseudo-influenza " described by SCHITTENHELM and to the " Bessarabia fever " described by BOEHNHARDT [this *Bulletin*, 1943, v. 40, 839] is admitted, but even if the disease were identical the name " Russian headache fever " is considered more suitable.

[In this article as well as in that by Boehnhardt on the similar disease, surprisingly little attention is paid to the question of transmission. Both diseases in all their essential clinical features fall well within the limits of variability of the fevers of the dengue-sandfly fever group so that the observers would have been expected to supply information regarding the known or possible prevalence of mosquitoes and sandflies. Of the three points relied on by the author for the exclusion of sandfly fever the first two might equally be regarded as evidence that the disease was a variety of sandfly fever, and the third loses most of its force in view of the disappearance of the disease with the onset of cold weather. In the absence of clear evidence regarding the prevalence of

mosquitoes and sandflies it seems likely that this fever, to which three new names have already been applied, may turn out to be an addition to the dozens of " new " diseases which have later been found to be dengue or sandfly fever. At any rate it ought to be regarded as belonging to the same group pending fuller information with regard to transmission.] *John W. D. Megaw.*

SYLLA, A. Ueber eine eigentümliche, mit zentralnervösen Störungen einhergehende Infektionskrankheit. [**A Peculiar Infectious Disease with Disturbances of the Central Nervous System.**] *Deut. med. Woch.* 1943, July 9, v. 69, No. 27/28, 503–6.

During the three months of August, September and October 1942, about 50 cases of a special type of fever were seen at an unspecified German military hospital. Evidence of infectiousness consisted in the occurrence of attacks in a nursing sister and four doctors who were attending the patients, and in the history of many of the patients, who stated that they had been associated with persons suffering from similar attacks. Lice could be excluded in most of the cases, but there was no evidence of the mode of transmission. A description is given of 12 of the most severe cases, but two of them, of long duration, resemble trench fever rather than the short fever now described. The general description is of a fever lasting two to three days, less often four days, with rapid onset and termination by lysis. There was headache referred to the orbital and supraorbital region ; this was severe, and movement of the eyeballs was often painful. There were pains in the nape of the neck and in the back. No definite Kernig's sign was observed. Occasional symptoms were conjunctival injection and vomiting, while diarrhoea and nasal catarrh were exceptionally observed. In several cases there was enlargement of the spleen ; tenderness of the spleen and liver was also observed in some. Occasionally there was enlargement and tenderness of the lymph nodes ; exceptionally there was a fleeting rash. It is stated that there was no recognizable change in the blood picture, but it is also said that in half of the cases in which a blood count could be made the leucocytes were increased to 12,000–15,000. During convalescence there were lymphocytosis and eosinophilia. Meningismus was of frequent occurrence, so was nystagmus. Slight delirium occasionally occurred. The cerebrospinal fluid was usually under slightly increased pressure ; it was clear, and the cells were 20 to 40 ; the Pandy reaction was positive.

Rapid and complete convalescence was usual, but in a few cases headache and weakness persisted for several days, exceptionally for some weeks.

Leptospiral infection was unlikely because of the epidemiological conditions and the absence of pronounced gastrointestinal disturbances in most of the cases. Sandfly fever was regarded as being excluded by the absence of herpes labialis, rash, tenderness of the muscles, or special findings in the eyes and nasal mucosa.

[The comments made on " Russian headache fever " apply in most respects to the present article except that high leucocyte counts are quite exceptional in fevers of the dengue-sandfly fever group. Apart from the somewhat enigmatic statement about this feature the description suggests a short fever caused by a filter-passing virus, and transmitted by a free-flying insect. Sandfly fever seems to be the most likely diagnosis.] *John W. D. Megaw.*

PAVLOVSKY, E. N. **A most Simple Method for destroying Mosquitoes (*Phlebotomus*) by catching them with a Racket in Buildings of European Type. (Contribution to the Prophylaxis of Pendinka and Papatassi-Fever.)** *C. R. (Doklady) Acad. Sci. URSS.* 1942, Nov. 10, v. 37, No. 4, 150–52, 1 fig.

The author describes an instrument resembling a racket with which one can catch sandflies (Phlebotomus) on walls and in corners. The face of the racket is smeared with some sticky material, for instance a vegetable oil or even soapsuds, and the edge of the racket is thickened with strips of wood to prevent the sticky surface coming in contact with the wall. The author finds that with this simple instrument he can catch considerable numbers of sandflies in a short time. The insects may be removed with alcohol for subsequent identification.

The author also discusses the importance, and the very great difficulties, of the control of sandflies and gives a brief account of some Russian work. Much emphasis is placed on the precise location of breeding places ; this must depend in its turn on methods for isolating early stages from large quantities of soil or manure.

[The word " mosquito " in the title refers solely to Phlebotomus. The word " Pendinka " means oriental sore.] *P. A. Buxton.*

PLAGUE.

SOKHEY, S. S. & HABBU, M. K. **Optimum and Limiting Temperatures for the Growth of the Plague Bacillus in Broth.** *J. Bacteriology.* 1943, July, v. 46, No. 1, 25–32. [10 refs.]

" The optimum temperature for the growth of an organism depends on a variety of factors " of which the most important are " (1) the composition of the medium, (2) number of organisms used as the inoculum, (3) the time chosen for observation, and (4) the criterion used for determining the optimum growth." In the present series of trials a standard broth medium was used, the inocula on an average contained 3·46 million organisms, and crop yield after exactly 36 hours of incubation was used as the criterion of optimum growth. Crop yield was estimated by counting colonies developing on a blood agar plate seeded with 0·05 ml. of the growth in 1–1,000,000 dilution. The broth media of *p*H 7·2, were used in 10 ml. quantities and the test tubes were of 1·7 cm. internal diameter. Statistical tests of significance were applied to the data obtained and it was found that the optimum growth temperature of the plague bacillus was 27° to 28°C. " The growth at this temperature was about five times the growth at 37°C. The limiting growth temperatures were —2°C. and 45°C."

W. F. Harvey.

SOKHEY, S. S. & HABBU, M. K. **Optimum and Limiting Hydrogen Ion Concentrations for the Growth of the Plague Bacillus in Broth.** *J. Bacteriology.* 1943, July, v. 46, No. 1, 33–7.

Plague bacilli have been reported to grow best in slightly acid media. The present trials have made use of more accurate methods with unbuffered broth media, the *p*H of which did not change during

a 36-hour period of incubation. Buffering of the medium was found to cause a marked reduction of the growth. A range of *p*H 6·2 to 8·0 was used for the main experimentation but "separate tests were made with *p*H values extending as low as 4·8 and as high as 9·8." In this latter case, because of the poorer growth, the period of incubation was increased to 48 hours. It was found that limiting *p*H values for the growth of the plague bacillus were 5·0 and 9·6 at the optimum temperature of 28°C. Maximum growth was obtained between *p*H 7·2 and 7·6 and fairly good growth between *p*H 6·6 and 8·0.

W. F. Harvey.

CHOLERA.

WENDEROTH, H. Ueberempfindlichkeitsreaktionen nach Cholera-schutzimpfung. [**Hypersensitiveness to Cholera Inoculation.**] *Deut. med. Woch.* 1943, June 11, v. 69, No. 23/24, 445–7.

Local and general reactions after cholera inoculation are well known: redness, swelling, pain, enlargement of regional lymph nodes, moderate fever, headache, loss of appetite and temporary diarrhoea. These are of little consequence, but occasionally more alarming symptoms make their appearance. In the causation of these, contamination and affections such as erysipelas, scarlet fever, arsenical rashes, etc., have to be excluded. Major incidents of this description are scarlatiniform varicella-like rashes with rigors and high fever. Many thousands of inoculations for cholera were given at the hospital where the three cases described occurred. The first of these cases was in a well-nourished man aged 42, who had had typhoid inoculation without reaction. Three days after the first cholera inoculation (0·5 cc.) the patient suffered from intense itching of the skin, slight shivering and a feeling of swelling in the mouth. The skin began to redden and the patient had rigors; any pressure on the skin caused great pain. The temperature was 39·7°C. (103·5°F.) and the skin became bluish-red all over, including the scalp. Cutaneous haemorrhage was apparent in places, the face was swollen and especially the eyelids. The tongue was much furred, the throat showed mucus but the tonsils were not affected; all palpable lymph nodes were enlarged. No heart or lung conditions were detected and the abdomen was soft. The urine contained albumen but no sugar; blood haemoglobin was 80 per cent. and leucocytes 16,400, but there was at first only 2 per cent. eosinophilia. The temperature fell to normal in three days and the rash disappeared gradually but the eosinophils rose to 8 per cent. The patient was convalescent in two weeks. A sensitivity reaction was applied by means of a small intracutaneous injection of 1–1,000 cholera vaccine, with appropriate controls. The reaction to the cholera was a positive 2 cm. redness in about six hours. Two other cases are described and all three are regarded as an individual, primary hypersensitivity to the bacterial protein.

W. F. Harvey.

BACILLARY DYSENTERY.

WILKE, G. Polyneuritiden nach chronischer Enterocolitis, insbesondere nach Ruhr. [**Polyneuritis after Chronic Entero-colitis particularly after Dysentery.**] *Deut. med. Woch.* 1943, June 11, v. 69, No. 23/24, 4434.

During the battles on the Eastern (Russian) Front numerous examples of polyneuritis were observed which resembled so-called idiopathic inflammatory polyneuritis. These exhibited predominantly motor paralyses and sensory disturbances. Most of the patients gave a previous history of specific infection with Flexner or Shiga-Kruse bacilli. All degrees of nerve involvement have been observed. Since the paralysis affected chiefly the proximal muscles, it was evident that the condition was a proximal nerve paresis, and so differed from the well-known type of degenerative-toxic polyneuritis with distal pareses. Subacute mild forms tended to predominate from July to September, 1942, during the maximum incidence of dysenteric infection.

At first the true neuritic nature of these complaints was overlooked and the symptoms were attributed to neurosis. Patients complained mostly of difficulty in walking, squatting or stretching out their arms. More detailed examination revealed motor weakness of proximal muscles, especially those of the shoulder-girdle and of the pelvis with some obvious muscle atrophy. In the early stages the ilio-psoas, quadriceps, glutei, deltoid, serratus, supra- and infraspinati and abdominal muscles were affected. Pain and increased sensibility on pressure were noted, so that the clinical picture resembled that of progressive muscular pseudo-dystrophy, or what the French call the "pseudomyopathic" form of polyneuritis.

In the early stages the tendon reflexes were increased, but were subsequently diminished. The electric excitability of the muscles was usually also increased. The relationship of these complications to dysenteric toxins was shown by the frequent coexistence of conjunctivitis and exudative arthritis, and sometimes of non-specific urethritis.

In October and November 1942, severe chronic polyneuritis cropped up. Usually these cases exhibited signs and symptoms of chronic dysentery with mucoid or purulent stools and ulceration of the sigmoid colon as visualized by sigmoidoscopy. In a few cases cultures of Shiga-Kruse bacilli were obtained by rectal swabs. Usually polyneuritis supervened when the stools became formed. Proximal muscle groups were affected, mainly those of the back and neck. In some cases the facial nerve was implicated. Degenerative electrical reactions were noted in two cases in the deltoid and quadriceps. Sensory disturbances of the distal type supervened so that superficial sensory changes in the distal extremities, ataxia and deep sensory disturbances, were prominent.

The cerebrospinal fluid in severe forms showed marked changes. The protein content was increased to $\frac{1}{3}$–$\frac{1}{2}$ part per thousand, and usually there was a mild pleocytosis.

The most severe polyneuritis was associated with dysenteric polyarthritis. Prognosis depended on the healing of dysenteric lesions and improvement in general condition, but recovery was usually remarkably rapid; in one case fatal pneumonia supervened.

The supposition that these neuritic phenomena were in any way due to an independent virus infection received no support.

P. Manson-Bahr.

AMOEBIASIS.

HOOD, Marion. **The Incidence of Amoebiasis observed at a Chicago Hospital over a Twelve Year Period.** *Amer. J. Trop. Med.* 1943, May, v. 23, No. 3, 327-32.

During the 12 year period 1930 to 1942, 1,999 patients and employees at the Research and Educational Hospital, Chicago, were examined by various methods for intestinal protozoal infections. Most of them had some form of gastro-intestinal disorder. Over the whole period there was an average of 7·9 per cent. harbouring *Entamoeba histolytica*. Routine examination of 103 normal individuals gave an infection rate of 0·97 per cent., while an examination of 243 patients with gastro-intestinal symptoms showed an infection rate of 2·05 per cent. The years 1933 and 1934 are those in which the Chicago amoebic epidemic occurred, and about this time the examinations described in this paper showed an increased incidence of amoebic infections. Some data of the incidence of *E. histolytica* and other intestinal protozoa encountered in patients and food handlers are also given. *C. M. Wenyon.*

IVASHOF, Grace I. **Studies on the Transmission of Amoebiasis in a Children's Home in New Orleans.** *Amer. J. Trop. Med.* 1943, July, v. 23, No. 4, 401-19, 3 figs. [31 refs.]

In a children's home, in which 130 children, mostly orphans up to six years of age, were cared for, examinations carried out yearly from 1931 to 1941 revealed a very high rate of intestinal protozoal infections. In 1939 the *Entamoeba histolytica* rate was 84 per cent. In 1941 the older group of children, aged four to six years, gave the following infection rates: *E. histolytica* 56·4, *E. coli* 73·0, *Endolimax nana* 70·0, *Giardia intestinalis* 67·5, *Chilomastix mesnili* 18·7, *Iodamoeba bütschlii* 5·4, *Trichomonas hominis* 10·8, *Enterobius vermicularis* 24·3, *Trichuris trichiura* 65·0. These results appeared to indicate the suitability of the home for a study of the method of spread of these infections, about which there was little precise information. Thus, in the case of *E. histolytica* the only sites in which cysts had been found, apart from the intestinal contents of warm-blooded hosts, were under the finger nails of human beings and on the surface, or in the intestinal contents, of house flies. Observations on outbreaks of amoebic dysentery had seemed to indicate that contaminated water was the chief source of infection, for cysts of the parasitic amoebae are quickly killed by drying. With this information available it was decided to make a careful study of the home from the point of view of the distribution of cysts and their transference from one child to another.

The home was apparently very clean, with daily dusting and a thorough cleaning once a month. The children were well looked after, the wearing apparel and bed clothes being frequently changed and laundered. There was a good provision of toys, including a sandbox and two wading pools. The investigation consisted in the collection, by brushing and swabbing, of dust, surface washings from tables, toys, seats and underclothing, water from the bathing pool, etc. This material was subjected to centrifugation in a Foerst centrifuge capable of handling a continuous flow of water. The deposit was finally concentrated by flotation with zinc sulphate solution.

The general result was the discovery of cysts or eggs from the hands and soiled underclothing, laundry chute, sand in the playbox, pool contents, tops of boxes, chairs, seats of toys, bed frames, laundered underwear, toys, bookshelves, swings and slides, floors and stairways. There would seem to be little doubt that the cysts and eggs in these localities had originated from the children and that the method of transmission in the home was by direct contact of one child with another, aided by the general pollution of the environment. This conclusion is supported by the results of the examination of the daily routine of the children, which affords an explanation of how the organisms were able to reach the places where they were found.

Having demonstrated the environmental contamination, efforts were made to eradicate it by thorough cleaning and mass treatment of the children and attendants. The whole home and contents were subjected to applications of live steam. Four weeks after these procedures the examination of a single specimen from each child by the direct film method and by zinc sulphate centrifugal floatation failed to reveal a single case of *E. histolytica* infection. *C. M. Wenyon.*

ROYO MONTAÑÉS, M. Disenteria amibiana en el niño lactante. [**Amoebic Dysentery in Infants.**] *Med. Colonial.* Madrid. 1943, Oct. 1, v. 2, No. 4, 280–300.

After giving extracts from reports of many writers who have remarked on the rarity of amoebic dysentery in infants at the breast, the author gives notes of 11 cases in children ranging in age from 4 to 12 months. Of these, one was 4 months old, three were 8 months, one of 9, one of 10, two of 11, and three of 12 months. It is only fair, however, to add that all had been artificially fed, two of them from birth, two after 2 months, one after 3 months, two after 4 and two after 5 months; two others were fed partly on the breast and partly artificially from birth. All reacted to the usual treatment.

H. Harold Scott.

MORSE, Esther M. & SEATON, S. P. **Amebic Infection of the Vagina and Uterus.** *Amer. J. Trop. Med.* 1943, May, v. 23, No. 3, 325–6.

Three cases of infection of the uterus and vagina with *Entamoeba histolytica* leading to discharge of blood and muco-purulent material are described from Hainan Island, China, where amoebic dysentery is common. One of the patients had an associated intestinal amoebic infection. Treatment consisted of douches combined with hypodermic injections of emetine, and quinine by the mouth for fever which may have been due to malaria. *C. M. Wenyon.*

VON BRAND, T., REES, C. W., JACOBS, L. & REARDON, Lucy V. **Studies on Reducing Substances and Gas Formation in Cultures of *Endamoeba histolytica* and a Single Species of Symbiotic Bacteria.** *Amer. J. Hyg.* 1943, May, v. 37, No. 3, 310–19, 3 figs. [12 refs.]

The authors have shown that the egg emulsion forming the slants of the Locke-egg-serum medium employed for the cultivation of *Entamoeba histolytica* contains from 278 to 312 milligrams per cent. of reducing substances. When the slants are covered by the liquid part of the medium, diffusion of these reducing substances from the egg

emulsion takes place over a week, with a final concentration in the liquid of 40 milligrams per cent. If glucose up to 300 milligrams per cent. is added to the liquid overlay, diffusion still takes place but is less rapid. In the medium, with or without sugar, *Entamoeba histolytica* with a single bacterium or the bacterium alone was grown. In all cases the reducing substances were almost completely utilized in 24 to 48 hours. There was no detectable difference in this respect between the cultures of the amoebae with the bacterium and those of the bacterium alone. In both types of culture, gas, the prominent constituent of which was hydrogen, was produced in equal amount, an indication of an anaerobic metabolism. *C. M. Wenyon.*

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

MAZZOTTI, L. **Transmission Experiments with** *Spirochaeta turicatae* **and** *S. venezuelensis* **with Four Species of** *Ornithodoros.* *Amer. J. Hyg.* 1943, Sept., v. 38, No. 2, 203–6.

The results obtained from a study of the experimental transmission of *Spirochaeta turicatae* and *S. venezuelensis* by means of *Ornithodorus amblus, O. furcosus, O. parkeri* and *O. hermsi.*

The two strains of spirochaetes were obtained from naturally infected ticks, *O. venezuelensis* and *O. turicata,* collected in Giron, Colombia, and in Aguascalientes, Mexico. Mice were infected with these strains and when numerous spirochaetes were present in the blood, the ticks being studied were fed on these heavily infected mice and subsequently after varying intervals fed on normal mice.

Ornithodorus amblus and *O. furcosus* were found incapable of transmitting *S. turicatae* or *S. venezuelensis* by biting, nor can *S. venezuelensis* be transmitted by *O. parkeri* or *O. hermsi.* The inoculation of triturated ticks into mice showed that *Spirochaeta turicatae* and *S. venezuelensis* survive only a few days in *O. amblus,* but at least 274 days in *O. furcosus. S. venezuelensis* can survive in *O. hermsi* and *O. parkeri* for some time, but less than four months. Similarly *S. turicatae* survives in *O. hermsi* for a similar period, but in *O. parkeri* for at least 304 days. *E. Hindle.*

LESH, J. I. & CANNON, D. A. **A Case of Leptospirosis in Southern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943, Sept., v. 37, No. 2, 89–94, 1 chart. [17 refs.]

The description of a case of leptospirosis in Southern Nigeria with clinical symptoms resembling those of yellow fever. The case was diagnosed by the presence in the blood of agglutinins to *L. icterohaemorrhagiae* (Wynberg strain) with a titre of 1 : 1000 on the 20th day of illness, which had dropped to 1 : 300 by the 39th day.

The patient had evidently acquired the infection near Ife, and it is suggested that it occurred through bathing in a small river in the bush, and that infected rats may be widely distributed through Southern Nigeria.

Leptospirosis had not previously been recorded from Nigeria although jaundice is a fairly common condition, 2,162 cases having been treated.

at the various Government hospitals during 1936 to 1938 inclusive. Of these cases 152 were entered as cholecystitis, 40 as yellow fever, and the remaining 1,970 as catarrhal jaundice. *E. Hindle.*

LEPROSY.

PARDO-CASTELLO, V. & TIANT, F. R. **The Histamine Test with particular reference to the Diagnosis of Leprosy.** *Arch. Dermat. & Syph.* 1943, June, v. 47, No. 6, 826–9.

The normal reaction of the skin to the histamine test depends on the integrity of sensory fibres of the peripheral nerves, and it is therefore negative when applied to anaesthetic patches of leprosy. As carried out by Sir Thomas LEWIS the intradermal injection of a 1 in 1,000 solution of histamine phosphate is followed by the immediate appearance of a purpuric spot at the site of injection, followed by an erythematous areola several centimetres in diameter and by the formation of a weal in the centre of the erythematous area; the whole reaction persists for 20 to 45 minutes. On an anaesthetic skin the weal duly appears, but the erythema is always absent. The test dose is 0·1 cc. of the histamine phosphate solution injected on the border between the normal and affected skin; the erythema stops abruptly at the margin of the anaesthetic area. In sensory paralysis due to spinal cord lesions and in syringomyelia, which has at times been confused with leprosy, the reaction is normal. The authors found the test to be of diagnostic value in neural leprosy cases. Their method is a slight modification of that of RODRIGUEZ and PLANTILLA [this *Bulletin*, 1932, v. 29, 268]; they make a slight intradermal prick with a hypodermic needle through three drops of a 1 : 1000 solution of histamine phosphate placed on the skin, one drop being on the affected skin, another on the border between the normal and the affected skin and the third on the normal skin; the drops are then wiped off. The sequence of events differs from that described by LEWIS: after 25–45 seconds the normal skin shows an erythematous area spreading to a diameter of 3–5 cm.; after 60–100 seconds a weal appears at the needle prick and after about three minutes a haemorrhagic spot appears at the same place. The authors found this method better than intradermal injection or scarification; they say, also, that the temperature of the room must be above 75°F. to obtain well-defined erythema in the normal skin. [Descriptions of the effects produced vary somewhat; other references are given in this *Bulletin*, 1940, v. 37, 337.] *L. Rogers.*

GARZON, R. & PITT, L. A. Neuritis leprosa tuberculoide a forma de abscesos caseosos multiples (3 observaciones). [**Multiple Caseating Abscesses of the Nerves in Tuberculoid Leprosy.**] *Rev. Argentina de Dermatosifilologia.* 1943, June, v. 27, No. 2, 247–57, 4 figs. [10 refs.]

The local lesions in the condition here described are fundamentally leprous neuro-granulomata and the changes are on the same lines as those of tuberculosis—giant cells, epithelioid cells and lymphocytes, caseation and cold abscesses. Reports on the presence or, rather, the

finding of bacilli vary. J. LOWE found them in half his cases [this *Bulletin*, 1935, v. 32, 336], SCHUJMAN in one out of three [this *Bulletin*, 1936, v. 33, 605], N. DE SOUSA CAMPOS in none of fifteen cases, and the present authors did not find them in any of their three patients. Pathologically, the necrosis and liquefaction take place in the nerve sheath and the pressure accounts for the pain. The cutaneous branches of the median, radial, auricular, external popliteal and other nerves are usually involved rather than the main trunks. Histologically, three zones may be seen: a central caseous mass; outside this the epithelioid cells, lymphocytes and a few plasmocytes, and outside that a zone of monocytic infiltration with dilated and congested capillaries. Treatment is surgical. *H. Harold Scott.*

BASOMBRIO, G. Beneficio del tratamiento chaulmoogrico intensivo en la lepra lepromatosa. [**Good Results from Intensive Treatment of Leprosy with Chaulmoogra.**] *Rev. Argentina de Dermatosifilologia.* 1943, June, v. 27, No. 2, 238–40.

The benefits of intensive treatment are seen in those who are in the early lepromatous or tuberculoid stages. Of patients seen at the Buenos Aires centre lepers in the highly contagious stages are sent to the National Health Department for segregation, those in the tuberculoid or incipient lepromatous stages are treated at the Centre. Perhaps it is by reason of their being in an early stage that such good results are obtained. The intensive treatment consists in giving large doses of the ethyl esters of chaulmoogra, 30 cc. weekly for 7–10 months. The author gives notes of three cases:—

1. An Italian woman of 31 years, with maculae on chest and limbs, thickenings of the skin of hands and face, anaesthetic patches, Mitsuda's reaction negative, bacilli present. She was started with 15 cc. of the esters twice a week but her tolerance was poor and the dose had to be reduced to 10 cc. and later to 5 cc., but between September 1940 and December 1942 she received 1,954 cc. At the end of this time the lesions had disappeared; the thickenings of the skin were no longer discernible, but the anaesthetic patches remained. Examination for bacilli in 24 places was negative.

2. An Argentine woman of 56 years with symptoms like those of the first. She was given 15 cc. twice a week for 15 weeks (=450 cc.) three times in the year (*i.e.* 1,350 cc. a year). The lepromata cleared up in two years. She had had irregular treatment for the preceding nine years without obvious benefit.

3. A woman of 17 years had been under various doctors till June 1941, when the intensive treatment was started. She was, however, intolerant of doses above 10 cc. twice weekly and by the end of the year she had had 440 cc., and in the following year 510 cc. Thereafter the intolerance increased and she could not take even 2·5 cc. and she was given a mixture of chaulmoogra and cod liver oil prepared at the National Department of Health. The lesions cleared and bacilli were no longer seen. *H. Harold Scott.*

FRANCIS, J. **Infection of Laboratory Animals with Johne's Disease and Leprosy.** *Nature.* 1943, Aug. 28, 250–51. [17 refs.]

Johne's disease is a progressive diarrhoea of bovines, contracted at an early age, and due to an acid-fast bacillus which in some respects

resembles that of leprosy as it is very difficult to cultivate and in that attempts to infect laboratory animals have not generally been successful. The author reports that he has succeeded in infecting very young mice (2 weeks old), with *Myco. johnei.* Experiments with the human leprosy bacillus have yielded only occasional successes in the case of the hamster and with mice and rats. He quotes from ROGERS and MUIR to show the much greater susceptibility of young children to human leprosy, and suggests that animal experiments with the causative organism should be repeated, using very young animals.

L. Rogers.

HELMINTHIASIS.

HOMPESCH, H. Ueber die Verbreitung von menschlichen Eingeweidewürmern in verschiedenen europäischen Landern. [**The Distribution of Human Intestinal Worm Infections in Europe.**] *Zent. f. Bakt.* I. Abt. Orig. 1943, June 15, v. 150, No. 4, 208–15. [39 refs.]

During the last few years 96,044 workers from nearly all the countries of Europe were examined for infection with intestinal worms. They were men aged 18–48 years and came from Russia, Poland, Croatia, Italy, Belgium, France, Holland, Denmark and Bohemia. The following worms were found: *Taenia solium, Taenia saginata, Ascaris lumbricoides, Enterobius vermicularis, Strongyloides stercoralis, Ancylostoma duodenale* and *Trichuris trichiura.*

Two fresh preparations of faeces were examined microscopically for eggs, and a search for ancylostome larvae was made by Loos's method of culture with animal charcoal. The highest infection rates were among the Croats (35·38 per cent.) and Italians (28·66 per cent.). Infections with Ascaris and Trichuris were by far the commonest, while hookworm infection was very slight.

The author gives a summary of previous investigations in Germany and other European countries and does not claim that the present examination has any statistical value for the following reasons: the use of concentration methods would probably have given higher figures; the incidence of infection varies greatly in different parts of a country and it may vary in successive years and in different seasons.

J. F. Corson.

GELFAND, M. & OSBURN, H. S. **Katayama in Southern Rhodesia.** *Clin. Proc.* Cape Town. 1943, July, v. 2, No. 7, 169–73.

When bilharziasis is localized to the bowel or bladder, it is not usually difficult to diagnose, provided that specimens are carefully and regularly examined. Before the disease is localized, diagnosis is practically impossible, unless the syndrome called Katayama disease occurs. Katayama usually begins about 4–6 weeks after exposure to infested water; its important features are irregular or remittent fever lasting 3–8 weeks; urticaria on any part of the body with severe itching; eosinophilia, which begins soon after the fever and soon reaches a maximum, falling then to a lower figure which persists a long time; and, 10–12 weeks after exposure to infestation, the appearance of eggs in the faeces and urine. The complement fixation test

would be a great help, but it is not done in Southern Rhodesia. Katayama is well recognized in Japan and Egypt. Gelfand [this *Bulletin*, 1943, v. 40, 398] reported the first case in Rhodesia and since then he has seen two more; all three occurred in Europeans. The native probably also suffers from it, but does not see a doctor until he is very ill, and the urticaria is not so easily seen on a dark skin. The European cases were diagnosed as urticaria or a typhoid-like fever. Large numbers of people are probably infested with Bilharzia in Southern Rhodesia, and Katayama is probably often overlooked; it is especially important to recognize it in cases of intestinal bilharziasis.

A fourth case is here reported in a European boy aged 11. Four weeks after exposure to infested water the boy felt ill and had a rash over his legs for two days. A few weeks later he was still unwell with frontal headache, loss of appetite and slight cough; the spleen and liver were not palpable and there were no eggs of Bilharzia in the faeces or urine. The boy stayed in hospital for 11 days, his temperature varying between 99° and 101·4°F. throughout. On the third day he had severe pain in the left elbow which disappeared the next day. On admission his haemoglobin percentage was 76 and there were 56 per cent. of eosinophils. No malaria parasites were found. Seven days later a Widal test was negative, as was also an agglutination test for *Br. abortus*; the eosinophils were then 41 per cent. Fifteen days later the eosinophils were 52 per cent. and stool and urine examinations were negative. Some three months after this the haemoglobin was 80 per cent. and the eosinophils 12 per cent.; a little later these were 78 per cent. and 18 per cent. respectively.

No diagnosis was made, but the possibility of Katayama was considered likely. About eight weeks after discharge from hospital eggs of *Schistosoma mansoni* and *S. haematobium* were found in the stools. After a course of antimony the boy made an uninterrupted recovery. *G. Lapage.*

GAEHTGENS, W. Serodiagnostische Untersuchungen ueber Taenieninfektionen, unter besonderer Berücksichtigung der Zystizerkenkrankheit. [**Serodiagnostic Investigations on Taenia Infestations, with special reference to Cysticercosis.**] *Arch. f. Hyg. u. Bakt.* 1943, v. 129, No. 1/6, 133–57. [26 refs.]

Only a brief summary of this long and complex paper can be given.

The author begins with a brief account of work on the value of the complement fixation reaction for the diagnosis of intestinal infestations with Taenia and Diphyllobothrium and of the much better results obtained by serological studies in phases of tapeworm infestation (Echinococcus and Cysticercus) in which the parasites enter the tissues and body fluids. Like other authors quoted, Gaehtgens failed to find a serological reaction that is reliable for the diagnosis of tapeworm infestation of the intestine. Serological study in echinococcosis is, however, a valuable aid to diagnosis, if the antigen is carefully adjusted and the controls are satisfactory. In 1926 the author diagnosed serologically 94 out of almost 650 cases in which echinococcosis was either suspected or diagnosed by other methods.

Less is known of the serological diagnosis of cysticercosis (*Cysticercus cellulosae* of *Taenia solium*). A history of earlier work on the serological study of it is given. The author describes his method of making antigen by grinding up and extracting in carbolized normal saline cysticerci

obtained from pig muscle. He concludes that important diagnostic aid is obtained from the examination of the blood and cerebrospinal fluid of suspected cases by complement fixation and precipitation reactions. He describes his use of a flocculation test based on the technique of Meinicke. These tests showed adequate specificity if they were carefully done. The complications introduced by sera of syphilitic and pregnant patients and other difficulties are discussed.

Sera of patients with cysticercosis, which give a strongly positive complement fixation reaction react also with Echinococcus antigen and *vice versa*. The Meinicke flocculation reaction mentioned above is less likely to give such cross reactions. Differential diagnosis between echinococcosis and cysticercosis is, however, possible by the kaolin adsorption technique. The author describes his experiments with this.

A case is described of a young woman from whose frontal lobe a histologically diagnosed Cysticercus was removed ; X-ray examination and a positive skin-test with Echinococcus fluid indicated infestation also with Echinococcus. Interpretation of the serological tests in this case was difficult, because of lability of the serum ; it demonstrated the limits of serological diagnosis ; but on the whole it confirmed the clinical diagnosis, and after death Echinococcus was found in the lungs, liver and heart. *G. Lapage.*

D'ABREU, A. L. & ROGERS, L. **Bilateral Pulmonary Hydatid Cysts.** *Brit. J. Surgery.* 1943, Oct., v. 31, No. 122, 153–5, 3 figs.

CHIFFLET, A. & PEYRALLO, R. 60 observaciones de equinococosis pulmonar. [**Sixty Cases of Pulmonary Hydatid Cysts.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1942, Dec., v. 21, No. 6, 668–77.

LARGHERO YBARZ, P. & PURRIEL, P. Equinococosis pleural. [**Hydatid of the Pleura.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1943, Jan., v. 22, No. 1, 56–66, 7 figs.

CHRISTIE, J. R. [Editor] *et al.* **An Introduction to Nematology. Section II. Part II. Chapters IV–XI.** pp. 243–372, figs. 165–202. [Numerous refs.] 1941. M. B. Chitwood, P.O. Box 425, Babylon, N.Y., U.S.A.

This part of the work on nematology which is being published in Sections and Parts, contains much that is of direct medical interest. In Chapter VI Asa C. CHANDLER, J. E. ALICATA and M. B. CHITWOOD describe the life-history of the parasitic nematodes of vertebrates ; in Chapter VIII W. W. CORT, Eloise B. CRAM and D. L. AUGUSTINE discuss the epidemiology and control of human parasitic nematodes ; and in Chapter IX anthelmintics are fully dealt with by W. H. WRIGHT and P. D. HARWOOD. There are numerous excellent drawings and full bibliographies. *J. F. Corson.*

KRAUSE, G. R. & CRILLY, J. A. **Roentgenologic Changes in Small Intestine in Presence of Hookworm.** *Amer. J. Roentgenol. & Rad. Therapy.* 1943, June, v. 49, 719. [Summary taken from *J. Amer. Med. Ass.* 1943, Sept. 25, v. 123, No. 4, 235–6.]

Krause and Crilly show that infection with the hookworm, Necator americanus, causes alterations in the small intestine which they designate as the " deficiency pattern." If this pattern is seen, the

stools should always be examined for the ova of intestinal parasites. The authors studied the small intestine of 97 young white men who were known to harbor Necator americanus and who had no other disease known to cause the deficiency pattern. Of the 44 patients with clinically significant "hookworm disease," 40 showed the deficiency abnormalities, which were moderately or far advanced in 26. Of the 53 patients with asymptomatic, incidental hookworm infection, 33 had a normal small intestine, 16 showed minimal variations from the normal and only four had severe alterations of the normal pattern. After anthelmintic therapy alone there was a return toward, but not to, the normal pattern, in those with severe involvement. Minimal alterations disappeared entirely in some instances. A significant correlation exists between the presence and extent of the physiologic alterations seen on the roentgenograms, the clinical findings and the severity of the infection with the hookworm.

McNamara, K. N. **Ruptured Liver Abscess and Round Worms. With a Note on the Use of Spinal Anaesthesia in Infants.** *New Zealand Med. J.* 1943, Aug., v. 42, No. 230, 171–3.

The author reports on the case of a half-caste Maori boy, aged 2, who had been quite well until four days before his admission to hospital. During these four days he had vomited intermittently and the abdomen had been tender for three days. The temperature was 101°F., the pulse 130, the abdomen distended and rigid with generalized tenderness. Respirations were 40 per minute, shallow and grunting. Peritonitis from a ruptured appendix was diagnosed. Operation under spinal anaesthesia revealed a normal appendix ; the abdomen was full of thick turbid fluid containing flakes of purulent, cheesy exudate and the bowel coils were matted together with thin fibrino-purulent exudate on their serous surfaces. In one loop of the ileum two coiled Ascarids were felt. Autopsy revealed a large, suppurating area, three inches in diameter, with an inflammatory zone around it, at the periphery of the right lobe of the liver, high up under the diaphragm. Irritation by this possibly caused the rapid, grunting respirations. On section the lesion showed a honeycombed appearance ; no adult worms were found in the liver. *Staphylococcus aureus* was cultivated from the peritoneal fluid. There was a marked eosinophilic reaction in the liver. The author suggests that a clump of Ascarid larvae had become stranded in the liver and had set up an infection there.

G. Lapage.

Longinov, A. N. [**An Experiment in the Treatment of Infestation with *Ascaris lumbricoides* with Hexyl Resorcin.**] *Sovietskaja Medicina.* [=*Soviet Medicine.*] 1943, No. 4, 27–8.

Remarking that santonin is not only contraindicated by certain conditions (gastroenteritis, acute and chronic infections, kidney troubles) but is also not always effective against Ascaris, the author states that it is chiefly ineffective in patients who are passing unfertilized eggs of Ascaris. Longinov has noted that unfertilized eggs of *Ascaris lumbricoides* predominate over fertilized eggs in the autumn while by January the number of each is about equal. There is thus some foundation for pushing the dose of santonin in the summer. Additional reasons for this are that summer diet is unfavourable to

the Ascarids and that their resistance varies at different times of their life. Recalling the fact that some insects die soon after copulation, the author suggests that this may explain the better effect of santonin against fertilized Ascarids. [Presumably he means that Ascarids which have copulated are less resistant and will soon die in any event.] He suggests the same reason for the fact that he found that hexylresorcinol, like santonin, is less effective in the autumn.

Hexylresorcinol was tried during the months May to September. The patients had a saline purge in the evening and no food after supper until 8–10 next morning. Hexylresorcinol was then given in capsules. A second saline purge followed 12 hours later or next morning. Most of the patients were adults who were passing unfertilized eggs of Ascaris; from some of them santonin had failed to expel the worms. "Positive results" were obtained in 65 per cent. of 93 cases. This is a lower percentage than that obtained by some other workers (Braun, 75 per cent. after a single dose and 95 per cent. after repeated doses [no reference given]). Longinov suggests that his results were not so good because he was treating patients passing unfertilized eggs. In 20 per cent. of patients pains in the throat and intestine and a bitter taste in the mouth were observed; but some patients disobeyed the instructions, breaking open the capsules and taking the drug in water. Hexylresorcinol expelled Ascarids from patients from whom santonin had failed to expel them. It can be used for such cases, but it cannot replace santonin, being too expensive and too difficult to obtain.

No references are given, but a few papers on the use of santonin and hexylresorcinol are mentioned and quoted. *G. Lapage.*

Young, May R. **Threadworms in Children in England.** [Summary.] *Proc. Roy. Soc. Med.* 1942, Aug., v. 35, No. 10, 684–5 (Sect. for Study of Disease in Children 28–9).

The author has found 42 per cent. of 119 children in St. Bartholomew's Hospital positive for Enterobius on examination of three cellophane swabs from the anus for each child, and 55 per cent. of 40 positive, on examination of two such swabs, in residents of a London nursery school. In the first group only 5 per cent. showed ova in the stools. *Charles Wilcocks.*

Donaldson, A. W. **The Prevalence of Pinworm Infection in an Ohio Institution for Children.** [Research Notes.] *J. Parasitology.* 1943, Aug., v. 29, No. 4, 298–9.

An examination for Enterobius infection was made of 269 children aged 3–18 years, who lived in an institution in Ohio; the N.I.H. swab method was used. No child was examined more than twice and only 77 of the 192 who gave negative results at the first examination were re-examined. Positive results were obtained in 72 (46 per cent.) of the 158 boys and in 34 (31 per cent.) of the 111 girls.

The living conditions in the institution were good—excellent sanitary facilities, separate beds, and different age-groups in separate dormitories; daily bathing, however, was not required and the children usually wore their clothing for several days.

The percentage infection (39) is considerably lower than the average percentage infection (63) for persons living in institutions in six localities in North America, summarized by Cram [*An Introduction to*

Nematology, edited by J. R. CHRISTIE, 1941, Sect. II, Part II, 322–4; see also this *Bulletin*, 1943, v. 40, 618]. "The present report is submitted as an addition to the existing data . . ." *J. F. Corson.*

KATHE, J. & PETERS, F. Ueber die Trichinose und ihren Nachweis, unter besonderer Berücksichtigung der immunbiologischen Verfahren. [**On Trichiniasis and its Diagnosis, with special reference to Immunobiological Methods.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Apr. 20, v. 103, No. 1, 1–25, 4 figs. [51 refs.]

This paper is reviewed in *Bulletin of Hygiene*, 1943, v. 18, p. 918.

DEFICIENCY DISEASES.

BROCK, J. F. **Malnutrition in South Africa.** *South African Med. J.* 1943, July 24, v. 17, No. 14, 219–22. [10 refs.]

Starvation is not common in South Africa, but still occurs seasonally among non-Europeans in some districts. Vitamin or mineral deficiency diseases are very common in non-Europeans, and states of subnutrition (in which efficiency and stamina can be improved by the provision of more protective foods) were found in 40·3 per cent. of over 58,000 European schoolboys during one survey.

The author discusses these questions, and the diets necessary for health, in relation to South African conditions. He states the problem, and suggests the remedies, somewhat as follows :—The present production of protective foods is quite inadequate ; milk production represents no more than one-tenth of a pint per person daily, the production of potatoes and vegetables is sufficient for only 2·1 and 5 million persons, of a population of 10 millions. The solution is to increase the agricultural production and purchasing power *pari passu*, but until these can be raised to an adequate level, schemes of food subsidy must be applied, such as (to the consumer) free milk and cheese in schools, or cheap butter. The fertility of the soil must be restored and maintained, and the fishing industry exploited.

"It is not the responsibility of the medical profession to decide what are the best remedies for malnutrition, but it is our responsibility to insist that a remedy be found. Those who have studied the problem know that there is a remedy which could rapidly be applied if public ignorance and indifference could be stimulated into a demand for action." *Charles Wilcocks.*

FEHILY, Lydia. **The Differential Diagnosis of Infantile Beriberi.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1943, Sept., v. 37, No. 2, 111–23. [17 refs.]

The so-called *infantile beriberi* differs from adult beriberi in its sudden onset and acute and malignant course, like that of some toxic condition, the toxin being, in the author's view, methyl glyoxal, an intermediate metabolite of carbohydrates in the absence of vitamin B_1. Methyl glyoxal is found in the blood, cerebrospinal fluid, urine and milk of avitaminotic subjects. She presents the following scheme or classification of infantile beriberi, according to the symptoms presented and the course of the disease.

INITIAL INFANTILE BERIBERI

Vomiting, restlessness, pallor, flabbiness, anorexia, insomnia, meteorism

SUBACUTE INFANTILE BERIBERI

Vomiting, puffiness, oliguria, meteorism, abdominal pain, dysphagia, aphonia, tonic convulsions, diarrhoea

ACUTE INFANTILE BERIBERI
Cyanosis, dyspnoea, running pulse

CHRONIC INFANTILE BERIBERI
Vomiting, loss of weight, retarded growth, inanition, anaemia, head retraction, aphonia, oliguria, oedema, constipation, meteorism

Dr. Fehily then discusses the differential diagnosis and states that, in general, infantile beriberi should be suspected in all cases of persistent vomiting in breast-fed infants who show no physical signs of disease. Bronchitis, slight fever and aphonia are other symptoms, the aphonia being due to oedema in the early stage, to paralysis in the chronic stage and to both these in the subacute. In the subacute stage diagnosis must be made from dyspepsia, cerebrospinal fever (there may be rigidity of neck and extremities, strabismus and fever, but the c.s.f. is clear and under normal pressure), nephritis (from puffiness of hands and feet, but there is no albuminuria as a rule, and reflexes are diminished, and improvement follows administration of vitamin B_1), peritonitis (owing to the vomiting, abdominal pain, tenderness and meteorism). Acute infantile beriberi may have to be differentiated from cardiac disease, laryngeal diphtheria, laryngismus stridulus, and the chronic form from tuberculosis and syphilis.

A point to be specially noted is that " infantile beriberi is not synonymous with beriberi in infants, as infantile beriberi is a separate entity " [whatever that may mean] caused by ingestion of milk of B_1 avitaminotic women. The mothers are living on the verge, as it were, of avitaminosis and the additional strain of pregnancy and lactation turns the scale. *H. Harold Scott.*

FERGUSON, J. W. **Pellagra following Gastro-Enterostomy.** *Glasgow Med. J.* 1943, Oct., v. 22, No. 4, 119–22.

HAEMATOLOGY.

NAPIER, L. E. & SEN GUPTA, P. C. **Studies in Haemolysis. With 'Histological Notes' by** N. V. BHADURI & **'Statistical Analysis' by** C. C. SEKAR. *Indian J. Med. Res.* 1943, May, v. 31, No. 1, 75–101, 4 graphs, 4 figs. (2 folding) & 2 pls. [12 refs.]

Haemolytic sera were produced by repeated injections into rabbits of washed monkey cells and were used to study the effects of haemolysin on red cells *in vivo* after intravenous injection into monkeys.

After a single large dose of haemolysin there is an acute haemolytic crisis starting almost immediately after the injection and indicated by severe prostration, haemoglobinaemia, haemoglobinuria and anaemia. Although there is certainly a sudden lysis of a considerable number of red cells an early blood count may not show it, probably owing to a compensatory haemoconcentration resulting from the general reaction to the haemolysin. The crisis passes away by the next day and the anaemia becomes apparent. There is a decrease in the diameter of the red cells with an increase in thickness (spherocytosis) and an increase in fragility running parallel with the increase in cell thickness. There is no recurrence of the haemolytic phenomenon but the spherocytic character of the cells remains. The diameters and the mean cell volumes progressively decrease and it seems as if the haemolysin not only makes the cells spherocytic but also causes a shrinkage of the cells day by day. This is against the conception that the cell envelope is plastic but not elastic ; alternatively it may be that the cells of large volume and diameter are destroyed earlier than the smaller cells. Eventually all the spherocytic cells are lysed and after about three weeks none remains. New cells appear from about the third day after the haemolysis. They are larger than the normal cells of the monkey, both in volume and diameter, and at first are very irregular in size and shape. Later the diameters of these new cells assume a more uniform distribution and the mean cell diameter decreases until the normal blood picture is regained.

Repeated doses of haemolysin, over a period of four days, produced a fulminating haemolytic anaemia with repeated attacks of haemoglobinuria, severe prostration and a high bilirubin content of the blood ; so severe was this anaemia that a terminal secondary infection supervened, the monkey dying about the eighth day of the experiment. The degree of spherocytosis was remarkable and the cells became extremely fragile, haemolysis occurring in 0·68 per cent. saline. A slight reticulocytosis occurred, although there was no sharp rise in reticulocytes, and the bone marrow showed some erythroblastic reaction. The Price-Jones curve showed a day-to-day shift to the left and there was evidence of slight new cell formation in the last three curves.

It is suggested that although the life of the spherocyte may be shorter than that of the normal cell, spherocytosis is not an immediate prelude to normal haemolysis. Spherocytosis may lead to intravascular disintegration of the cell, but if the effect falls short of this it does not materially shorten the life of the red cell. A similar state of affairs is seen in congenital haemolytic icterus when splenectomy decreases the rate of destruction of red cells but does not markedly affect the spherocytosis. *F. Murgatroyd.*

SEN GUPTA, P. C. **'Bengal Splenomegaly.' (A Study of 50 Cases with a Discussion of Aetiology.)** *Indian Med. Gaz.* 1943, Aug., v. 78, No. 8, 371–6, 1 map. [10 refs.]

" Bengal splenomegaly " is a condition whose nature has been under discussion for more than a decade [see this *Bulletin*, 1933, v. 30, 43 ; 1940, v. 37, 232]. The present article sets forth the characteristic features of it, summarizing them on the basis of 50 observed cases. The cause is undetermined and as long as this is so the non-committal term Bengal splenomegaly may be permitted. A map shows the distribution of the 50 cases discussed and most came from south and

south-west Bengal; very few, only five, from adjacent parts of Bihar and Orissa. All 50 were Indians, 40 males, 10 females. No patient was under 10 years of age; nearly one-third (16) were between 20 and 25 years. The onset is insidious in most cases; occasionally more acute with rigors and intermittent fever. Fever was present at some time in nearly all, intermittent in more than half (29) and irregular in 11 of the author's 50. The splenic enlargement was great. In 42 it extended to more than 5 inches below the ninth costal cartilage, and there was hepatic enlargement to 3 inches below the costal margin. Other features which might be observed were: loss of weight, emaciation, marked anaemia with haemic murmurs, oedema of the ankles, pulmonary catarrh, and occasionally ascites and icterus. A table of details of the haematological findings is given which the author summarizes in these words:—

"It will be seen that there is a moderate degree of anaemia, orthochromic and slightly macrocytic in type, with increase of reticulocytes. There is no increase in fragility, and the indications are that there is no marked spherocytosis in most cases. The van den Bergh test shows increased bilirubin content of plasma in about half the cases. A significant degree of leucopenia with relative decrease of neutrophils and increase of lymphocytes is present in an average case."

There follows a discussion on the cause of the anaemia and of this form of splenomegaly. It is argued that the anaemia is due to increased blood-destruction, *i.e.* it is haemolytic in type, and the histological changes in the spleen support this: thickened capsule, prominent trabeculae, atrophy of Malpighian follicles, dilatation of sinuses, which are packed with large phagocytes and multinucleated giant-cells engulfing red cells and leucocytes.

Epidemiologically, it is noticed that the patients come from the highly malarious districts of the Province.

The rest of the paper is given up to a short discussion on the possibility of a malarial origin, and to "specific hypersensitiveness to bacterial infection," but without coming to any definite conclusion.

H. Harold Scott.

BERK, L. & BULL, G. M. **A Case of Sickle Cell Anaemia in an Indian Woman.** *Clin. Proc.* Cape Town. 1943, June, v. 2, No. 6, 147–52, 4 figs. (2 on pl.)

This account is interesting for two reasons: First, because the patient was an Indian woman living in South Africa, in whose history there was no suspicion of any negro admixture. Second, because the results of transfusion could be accurately followed, by reason of the easily recognizable distinction of the donor's from the recipient's cells.

The patient, a married Indian woman of 22 years, had for 11 years been subject to backache, dyspnoea on exertion, epigastric pain, soreness of the eyes and attacks of pain and swelling of ankles, feet, wrists and hands, lasting up to three weeks. Blood-smear showed 10 per cent. of the red cells sickled; a sealed wet preparation showed 15 per cent. at once and 100 per cent. after 24 hours at room temperature. The cells showed increased resistance to hypotonic saline; haemolysis began at 0·45 per cent., 65 per cent. of the cells haemolysed at 0·3 per cent., and a few resisted haemolysis even in distilled water. Smears of the sternal marrow gave 35 per cent. of the nucleated cells as of the red cell series (normal 10·9–14·5). After a transfusion of

two pints of blood her temperature rose to 104·5°F., she had a rigor and complained of pain in the splenic region and left shoulder. Her blood count fell to below post-transfusion level. She had another haemolytic crisis some 20 days later, returning in a week to the previous state. After the transfusion there was a rise in the red cell count and during the next week the count of the patient's own cells was unchanged, but that of the cells from the donor fell; that is, during the first haemolytic crisis (which immediately followed the transfusion) it was the donor's corpuscles which haemolysed. In the second crisis haemolysis of the patient's own cells was occurring.

H. Harold Scott.

EVANS, W. **Elliptical Erythrocytes.** *J. Path. & Bact.* 1943, July, v. 55, No. 3, 378–81, 1 fig.

A Nigerian native with a chronic punched-out ulcer of the leg, tested for the sickle cell trait, showed no evidence of sickling but approximately 94 per cent. of his cells were oval, and the author believes this to be the first recorded case of ovalocytosis in an African. There was some anaemia, the first count being:—erythrocytes 4,160,000 per cmm., haemoglobin 80 per cent. (11·6 gm. Hb. per 100 cc.), leucocytes 9,000 per cmm. (neutrophils 19·8 per cent., eosinophils 27 per cent., lymphocytes 45 per cent. and monocytes 8·5 per cent.). Microfilariae of *A. perstans* were present in the blood and ova of *Ascaris lumbricoides* in the stool. The sternal marrow picture showed, in percentages, polymorphonuclears 26·75, neutrophil metamyelocytes 11·25, neutrophil myelocytes, 5·75, myeloblasts 0·75, eosinophils 15·0, eosinophil metamyelocytes 3·25, eosinophil myelocytes 1·25, lymphocytes 16·0, monocytes 4·5, normoblasts (all types) 15·0, megaloblasts nil, and proerythroblasts 0·5. About 80 per cent. of the mature red cells were oval in outline. The normoblasts were of the large early eosinophilic type comparable with those seen in conditions of prolonged peripheral loss of blood. Later a Price-Jones curve was made and the mean diameter of the major axis of the oval cells was found to be 8·38μ and that of the minor axis 5·29μ giving a mean cell area of 34·32$\mu\mu$ which would correspond with a mean cell diameter of 6·7μ for circular cells. During a reticulocyte count, with the dry brilliant cresyl blue supra-vital staining method, the oval cells assumed a circular form within five minutes of preparing the specimen and the same effect, but to a lesser degree, was found to occur with Osgood's cresyl blue solution. Ovalocytosis is not normally considered to be associated essentially with anaemia but it is thought, because of the presence of large early eosinophilic normoblasts in the marrow suggesting prolonged blood destruction for which no obvious cause was found, that in this patient the elongated cells may have been more vulnerable to destruction by the spleen and circulating monocytes. A "blood" uncle of the patient was examined and found to have cells of normal shape, but which "sickled" after 24 hours in a vaseline-sealed preparation.

F. Murgatroyd.

MISCELLANEOUS.

GARLAND, L. H. **Tropical Diseases of Interest to the Radiologist.** [Editorial.] *Radiology.* 1943, July, v. 41, No. 1, 75–7.

The editor observes that the aeroplane and the present war have resulted in the exposure of large numbers of Americans to various tropical diseases. Some of these may give radiographic evidence of their presence in persons who may be sent for radiological examination for other reasons. The radiograph may show the enlarged spleen of malaria and other tropical diseases, amoebic abscess, calcified filariae, lung changes due to paragonimiasis, calcified schistosome eggs in the urinary tract, or bone changes due to leprosy, syphilis, yaws, mycetoma, ainhum, or tropical ulcer, while Ascaris may be outlined with barium in a radiograph of the abdomen. *J. F. Corson.*

i. MORGAN, A. A. & SQUIRES, B. T. **Onyalai in Northern Bechuanaland.** *South African Med. J.* 1940, June 22, v. 14, No. 12, 231–3, 2 figs.

ii. SQUIRES, B. T. **A Further Note on Onyalai in the Bechuanaland Protectorate.** *Ibid.* 1943, Sept. 25, v. 17, No. 18, 292–3, 1 map.

i. Onyalai was reported in Southern Rhodesia in 1924, and in the Union of South Africa in 1938 [this *Bulletin*, 1939, v. 36, 157]. One of the authors observed cases in Bechuanaland as long ago as 1930, and in the present paper are recorded 24 cases from the Francistown area.

There were 19 males and 5 females, most of the patients were aged about 16 to 30. The seasonal incidence did not coincide with that of any other disease. Two stages are described: the prodromal stage, characterized by headache, malaise and generalized pain, never shorter than one day, and sometimes lasting for three; and the bleeding stage, with haemorrhage from the nose and mouth, and sometimes haematuria and melaena. The pathognomonic sign is the presence of tough, haemorrhagic bullae, with sharply defined margins, on the nasal or buccal mucosa. In one case 10 bullae were present on the third day; thereafter they disappeared, the mouth being clear by the 12th day.

Platelet counts varied between about 5,000 and 20,000; haemoglobin from 40 to 75 per cent.; serum calcium from 7·5 to 12·6 mgm. per 100 cc. The ascorbic acid content of the urine did not appear to have a significant bearing on the disease; moreover, most of the patients were well nourished.

Treatment consisted of intramuscular injection of human blood, but there was difficulty in finding donors free from malaria and syphilis. Calcium, iron and orange juice were also given; there were no deaths.

ii. In the second paper 52 cases are reported from the same area. In these again the predominance of males was evident. Treatment with whole blood did not seem to be specific; there were five deaths. No fresh light can yet be thrown on the aetiology of the disease, which can only be described as "an idiopathic form of thrombocytopenic purpura, exhibiting the characteristic bullae peculiar to itself." The author indicates that there is reason to think that the incidence of the disease in increasing. *Charles Wilcocks.*

MacNaught, W. W. & Murray-Lyon, R. M. **An Analysis of Acute Respiratory Conditions in African Soldiers.** *Brit. Med. J.* 1943, Sept. 11, 324–5.

Of 1,250 Africans admitted to a West African hospital, 375 (30 per cent.) suffered from respiratory infections. Lobar pneumonia accounted for 76 cases, and the authors remark that although the physical signs do not differ from those observed in Europeans, except for a rather higher incidence of lesions of the upper lobes, the response of the Africans to sulphapyridine is more dramatic than that of the Europeans. Nevertheless, in spite of this apparently rapid recovery, resolution is no quicker than in white men. Bronchopneumonia was present in 52; it responds well to sulphapyridine. Only seven cases of pulmonary tuberculosis were seen. The commonest disease was bronchitis. A case of paragonimiasis was diagnosed; treatment with emetine was successful.

An important aetiological factor in these cases of respiratory disease appeared to be chilling; the African does not withstand the effects of cold s well as the European. Sleeping on deck during sea transit, when the night air is cold, appears to affect the African severely; there was a peak of incidence in January, when the weather was at its coldest and the European community at its healthiest.

Charles Wilcocks.

Turner, E. L., Bent, M. J., Holloway, G. D., Cuff, J. R. & Quinland, W. S. **Nutritional Deficiency as an Etiologic Factor in Icterus accompanying Pneumonia in the Negro.** *Southern Med. J.* 1943, Sept., v. 36, No. 9, 603–8, 2 figs. [22 refs.]

The authors found that jaundice developed in 50 out of 74 cases of lobar pneumonia in adult negroes; this is an unusually high incidence. Various reasons for the occurrence of jaundice in lobar pneumonia have been suggested, one of them being that the cholaemia is of pulmonary origin; experiments on rabbits failed to support this explanation. To determine whether there was any evidence of a basic racial physiological factor, blood studies were made on 94 normal negroes aged 6–23 years; all the tests gave results within normal values.

Most of the 74 patients with pneumonia were very poor and had badly balanced and overcooked food; during that period (1936–38) also, unemployment among negroes in the district was very high. A common form of diet consisted of corn bread, fat "side-meat," turnip greens and sorghum (millet) and the food was much overcooked. As there is increasing experimental evidence that pathological changes in the liver are related to nutritional deficiency, it was thought that the poor diet might make the liver more vulnerable to pneumococcal infection; the authors, therefore, made the following experiment to test this.

Twelve dogs were given the above diet for 21–49 days and eight control dogs were given a well-balanced diet for 27–55 days. Then pneumonia was induced by insufflating the lungs with a culture of pneumococci (Type 1, Robertson) mixed with mucin and autogenous blood. Van den Bergh tests were made before the induction of pneumonia and twice daily afterwards; the former tests were all negative.

All the seven surviving control dogs gave negative reactions after the induction of pneumonia, while the nine surviving dogs on the restricted diet all gave positive reactions. The livers of the control dogs showed cloudy swelling and congestion, those of the others, however, showed fatty degeneration, most intense in the centre of the lobule.

The authors conclude from the experiments and clinical evidence that the high incidence of jaundice in their patients in 1936–38 was related to improper nutrition and suggest that more attention to diet should be paid in pneumonia. *J. F. Corson.*

VILLARINO ULLOA, R. Contribución al estudio del "ulcus tropicum" en Fernando Póo. [**Tropical Ulcer in Fernando Pó.**] *Med. Colonial.* Madrid. 1943, Oct. 1, v. 2, No. 4, 258–72.

The author gives brief notes of 58 patients with tropical ulcer, phagedaenic and other, observed by him in Fernando Pó. Before starting treatment he examines the fluid for spirochaetes; he found them in 26 of the 58. The majority (16) of these were from the north-east and east of the island, nine from the west, and one had come from Calabar. If spirochaetes are found he gives arsenicals such as neosalvarsan, and healing is rapid. Those who did not show spirochaetes did not respond to this treatment and time was wasted in trying it; hence the need for examination before beginning treatment. These others respond to antiseptics of various kinds: Dakin's solution, hydrogen peroxide, potassium permanganate, thymol, etc.

H. Harold Scott.

KEAN, B. H. **Death due to Akee Poisoning in Panama.** *Amer. J. Trop. Med.* 1943, May, v. 23, No. 3, 339–41.

A healthy negro boy, six years old, was suddenly seized with an attack of vomiting during the afternoon of the 28th February, 1942. He refused his supper and went to bed at 8 p.m., apparently well again; he had no fever and stated that he did not feel sick. At 2.30 a.m., March 1st, he awoke, cried out deliriously, "kicked his legs" and died. The whole length of illness from the first symptom till death, including the calm period [apparently some six hours] was less than 12 hours. The history is typical of an acute case of akee poisoning.

[This clear and succinct report is of great interest and of no little importance. When the abstracter first brought forward evidence that the "Vomiting Sickness of Jamaica" and "Ackee Poisoning" were one and the same, doubt was expressed because ackees were imported in considerable quantity to Panama and nevertheless cases of the disease were not known there. The explanation offered was that ripe fruit, *i.e.* safe fruit, was imported and not fruit in any of the potentially dangerous states, which SCOTT had defined [see this *Bulletin*, 1917, v. 9, 90]. This case, the first recorded on the Isthmus of Panama, effectually disposes of this doubt.] *H. Harold Scott.*

DE WAAL, H. L. & PRETORIUS, T. P. **South African Senecio Alkaloids. Part 6.—The Toxic Alkaloids of** *Senecio sceleratus* **sp. nov. Schweikerdt.** *Onderstepoort J. Vet. Sci. & Animal Industry.* 1941, July & Oct., v. 17, Nos. 1 & 2, 181–90, 2 figs.

LEVER, R. J. A. W. **Mosquitoes in Viti Levu, December 1942 to February 1943.** *Agric. J. Fiji.* Suva. 1943, v. 14, No. 1, 16. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943, Oct., v. 31, Pt. 10, 185.]

Aëdes aegypti, L., which breeds regularly in houses, and *A. vexans*, Mg., which breeds in ditches, puddles and ponds and bites in houses at night, caused great annoyance in Suva in December 1942 and January 1943. Later in January, the common mosquito in the north-west and north of Viti Levu was found to be *Culex fatigans*, Wied. Collections of larvae made in and near Suva during February consisted principally of *A. aegypti* from tins and drums, *A. scutellaris*, Wlk., from rot holes in trees, tyres, shells and soapstone drains, *A. vexans*, and *C. annulirostris*, Skuse, from drains in soapstone and earth and the latter also from weedy streams, and *C. fatigans* from drains in soapstone and dirty pools. The larvae are preyed on by the Notonectid, *Anisops cleopatra*, Dist., and dragonfly nymphs.

KING, W. V., ROTH, L., TOFFALETI, J. & MIDDLEKAUFF, W. W. **New Distribution Records for the Mosquitoes of the Southeastern United States during 1942.** *J. Econom. Entom.* 1943, Aug., v. 36, No. 4, 573–7.

HOARE, C. A. **Biological Races in Parasitic Protozoa.** *Biol. Reviews.* 1943, July, v. 18, No. 3, 137–44. [52 refs.]

The term " biological race " has frequently been employed without any realization of its precise meaning. This is perhaps more particularly the case with those parasitic protozoa which are liable to produce disease in man and animals. Thus, not infrequently, because a parasitic protozoon living in one host is incapable of establishing itself in another host which nevertheless harbours a seemingly morphologically identical parasite of its own, these two parasites are regarded as distinct species and are accordingly given distinctive specific names. This tendency has, in some quarters, increased to such an extent that the mere discovery of a certain parasite in a new host has been regarded as sufficient justification for the establishment of a new species and the introduction of a new specific name, without any attempt having been made to prove or disprove identity with similar, if not morphologically indistinguishable, parasites in other hosts. This procedure has often been responsible for considerable confusion in nomenclature which might frequently have been avoided if the real significance of biological races as applied to parasitic protozoa had been understood.

In his review the author examines the status of biological races which he defines as " such sub-divisions of a morphological species as are distinguishable by differences in biological characters only." In the case of parasitic protozoa these differences are to be found in various aspects of the host-parasite relationship. Thus there are races which differ only in that they parasitize different hosts (host specificity) or there are races which produce different types of disease in the same host. One race may differ from another only in being more virulent to a particular host. Furthermore, it will frequently be found that the biological races of a certain species will, as in the case of bacteria, stimulate the production of specific antibodies which may serve as a

means of distinguishing them from one another. All these various criteria for distinguishing biological races are carefully discussed by the author, who illustrates his remarks by frequent reference to the well-known haemoflagellates, haemosporidia and intestinal protozoa. He is to be congratulated on the manner in which he has tackled a most controversial subject and it is to be hoped that his review will do much to clear away many of the misconceptions which exist regarding the distinctions which should be drawn between species and biological races. *C. M. Wenyon.*

DOYLE, W. L. **The Nutrition of the Protozoa.** *Biol. Reviews.* 1943, July, v. 18, No. 3, 119–36. [Numerous refs.]

In this review the author summarizes advances which have been made in recent years in our knowledge of the cultural requirements of protozoa in pure or mixed culture in artificial media. These have shown that successful growth and propagation are influenced by many factors apart from the main constituents of the medium, such as the type of glassware and cotton plugs used, the *p*H adopted, the alterations caused by sterilization, the presence or absence of growth factors, including vitamins and minute quantities of inorganic materials containing iron, manganese, zinc, copper, vanadium and molybdenum, and the many changes which take place in the composition of the medium as the culture progresses. The results so far obtained largely through the investigations of the LWOFFS, PRINGSHEIM and HALL, to mention only a few of those who have devoted themselves to these studies, have enabled certain of these workers to draw up a nutritional classification of the protozoa in place of the older division into holophytic, saprophytic, parasitic and holozoic forms. There is, however, nothing final in such a classification, for the author admits, in his review involving the quotation of over 300 publications, that our knowledge of metabolism of representative Protozoa remains fragmentary. [Those who are interested in the nutrition of the Protozoa cannot do better than study the author's comprehensive summary of present-day knowledge and his long list of references to the literature of the subject, which cover both free-living and parasitic forms.] *C. M. Wenyon.*

BRICEÑO ROSSI, A. L. La coccidiosis en el hombre. Primer caso de "Isospora hominis" en Venezuela. [**Coccidiosis in Man.**] *Gac. Med. de Caracas.* 1943, Mar. 15, v. 50, No. 5, 55–9. [12 refs.]

In the faeces of a child three years of age a coccidium belonging to the genus *Isospora* was discovered. The parasite was identified as *Isospora hominis*. Though cases of this infection have been recorded from other parts of S. America, this is the first case to be noted in Venezuela. The child suffered from concomitant infections with Balantidium, Ascaris and Trichuris. The paper gives a list of the earlier records of human Isospora infections. *C. M. Wenyon.*

VAIL, D. **Chorioretinitis associated with Toxoplasma.** *Proc. Roy. Soc. Med.* 1943, Oct., v. 36, No. 12, 629–32 (Sect. of Ophthalmology 21–4).

This description of chorioretinitis associated with toxoplasma is based on two papers which have appeared in American ophthalmic

literature. The first, by KOCH, WOLF, COWEN and PAIGE (January 1943) deals with the disease in infants, while the second, by VAIL, STRONG and STEPHENSON (February 1943) deals with the condition in older children and adults. The author states that the first case was one recorded by JANKU in 1923, who noted the presence of parasitic cysts in the retinal lesion of the right eye of an infant who had microphthalmos of the left eye and increasing hydrocephalus from birth.

WOLF, COWEN and PAIGE [this *Bulletin*, 1940, v. 37, 236] demonstrated toxoplasma in granulomatosis lesions of an infant who had died of congenital encephalitis at the age of 31 days. There was a condition of chorioretinitis of both eyes.

In congenital cases the diagnosis according to SABIN [this *Bulletin*, 1943, v. 40, 637] can be made by the four symptoms—hydrocephalus or microcephalus, cerebral calcification, chorioretinitis, disturbances of nervous function. KOCH believes that the intra-ocular lesions of toxoplasmic encephalitis have certain characteristics which distinguish them from other forms of choroiditis. Among these are regularity of bilateral involvement of the macular region, tendency to bilateral occurrence of other than ocular lesions; presence of massive chorioretinal degeneration, extensive connective tissue proliferation and heavy pigmentation, tendency to associated congenital defects in the eyes and constant clarity of the media in the presence of severe chorioretinitis. In the authors' opinion, however, there is nothing in the ophthalmoscopic appearance of the lesions that is characteristic, at least in older children and adults who have been under his observation.

C. M. Wenyon.

VAN DER MEER, G., Mlle. & BRUG, S. L. Infection à pneumocystis chez l'homme et chez les animaux. [**Pneumocystis Infection in Man and in Animals.**] *Ann. Soc. Belge de Méd. Trop.* 1942, Dec. 31, v. 22, No. 4, 301–7, 20 figs. on 2 pls. [20 refs.]

In smears of the lung of a three-months-old child which had died of congenital malformation of the heart, cysts of *Pneumocystis carinii* were discovered. These resembled in every way the cysts discovered by CHAGAS in 1912 in the lungs of a man who had died of *Trypanosoma cruzi* infection and which at one time he regarded as possible stages of development of the trypanosome. Subsequently he abandoned this view and thought that there might have been some interchange of films made from animals. Though parasites of the same kind do occur in animals, the findings recorded in the paper under review render it probable that CHAGAS actually did discover cysts in his human material. This is all the more likely since the authors, having discovered the cysts in the child, were led to examine lung smears from other human cases. In two of 104 examined the same parasite was found. In addition, of a series of animals examined they were found in rats, mice and guineapigs.

The parasite occurs in the form of cysts about 10 microns in diameter and containing, when fully developed, eight sickle-shaped bodies. Apart from the cysts, the smears reveal multinucleate masses of rose-coloured material which in sections have a honeycomb appearance. These masses are often associated with the cysts and seem to be a stage in the development of the parasite, the features of which are illustrated in two plates in black and white. In a footnote the authors

point out that the present account is published in French for the benefit of those who are unable to read the original Dutch paper, the reference to which is *Ned. Tijdschrift voor Geneeskunde*, 1942, v. 86, III, No. 33.

C. M. Wenyon.

LADELL, W. S. S. **Effects of drinking Small Quantities of Sea-Water. An Experimental Study.** *Lancet.* 1943, Oct. 9, 441–4, 1 chart.

The effects of drinking sea-water on the chloride and water-balance and on urea excretion are reported and discussed. Subjects subsisting on a diet low in chloride and water-content were deprived of water for various periods and then given, in different experiments, moderate (540 cc.) or minimal (60 cc.) amounts of fresh water with or without 180 cc. of sea-water. It was calculated that the maximum intake of sea-water (containing 3·5 per cent. sodium chloride) from which all the sodium chloride would be excreted by the kidneys was of the order of 400 cc. per diem. Accordingly in a further experiment the salt water was increased to this theoretical maximum while the fresh water supply was first set at 240 cc. for several days, and for the last 36 hours totally withheld, the daily intake of salt water being increased to 600 cc.

General confirmation was obtained of the data on which the theoretical estimate of a permissible sea-water intake of 400 cc. per diem was based—*viz.* that the basic level of urine excretion of a man in total or partial water-debt is about 400 cc. per diem ; that, at low levels of intake, at least 66 per cent. of the ingested sea-water is also excreted as urine ; that the kidney can excrete urine containing sodium chloride concentrated to about 2 per cent. The formula which relates these data, and expresses the balance between the sodium chloride ingested in the sea-water (x cc. NaCl concentration=3·5 per cent.) and the sodium chloride excreted in the urine, is

$$35x=(400+0{\cdot}66x)20$$

[$35x$ represents the sodium chloride intake in milligrammes]

Thus for " the man on the raft," totally or partially deprived of fresh water, the daily ingestion of amounts of sea-water up to 400 cc. represents a slight gain to the body of water because the extra water lost is less than the extra water ingested.

The effects on urea elimination are also significant. When the body is totally deprived of water, the level of urea in the urine in due course reaches a maximum. This reduces the urine : plasma urea ratio and accordingly the urea clearance diminishes and nitrogen retention occurs. When small supplements of fresh water are taken this sequence occurs more slowly. The ingestion of extra sea-water (up to 400 cc.) increases the urine volume and augments the urea clearance provided the urine : plasma urea ratio has not diminished. Drinking sea-water in the amounts stated therefore diminishes or prevents nitrogen retention.

[A footnote to the above paper points out that the M.R.C. committee on the care of shipwrecked personnel did not recommend the drinking of sea-water in *Medical Research Council War Memorandum No. 8* " A Guide to the Preservation of Life at Sea after Shipwreck " (H.M.S.O., 1943). The decision not to do so was based on other relevant factors besides the evidence given in the above paper.]

J. S. Weiner.

BEACH, W. V. **Renal Colic of Dehydration.** *J. Roy. Nav. Med. Serv.* 1943, Apr., v. 29, No. 2, 135–6.

To a hospital ship stationed at a West African port there were admitted, in nine months, 38 patients with a diagnosis of renal colic. In 7 gross renal disease was present, but in 31 there was no demonstrable lesion. Two of the 31 patients had been under treatment with sulphapyridine but had received an inadequate amount of fluid; the other 29 cases form the subject of this short article.

They were patients who had newly arrived in the tropics, or who were employed in engine rooms; all showed the common picture of severe dehydration. The only other definite finding on examination was the presence of a few red cells in the urine. The renal colic induced vomiting, which in turn further depleted the body fluid. Some of the men had deliberately limited their fluid intake to avoid sweating, some had unavoidably been rationed for water, most were merely unaccustomed to taking the large amount of fluid so necessary in the tropics. Medical officers unused to hot climates frequently failed to appreciate the cause of the condition.

It is, therefore, necessary that this syndrome should be more widely known, and it should be realized that few of these patients need transfer to hospital. Treatment is simple: intravenous morphine is given slowly until the pain, with the consequent vomiting, is abolished; for this purpose $\frac{1}{8}$ to $\frac{1}{2}$ grain is usually enough. The patient is kept awake and made to drink as many pints of water as he possibly can during the next three hours. By the time the effect of the morphine has passed off, satisfactory diuresis is usually established. Ample fluid intake must be maintained for the next few days. [The author makes no mention of salt replacement, which it would be well to bear in mind, see this *Bulletin*, 1944, v. 41, 74. This form of renal colic, presumably due to deposition of salts in the urinary tract, has also been observed in hot, dry countries where fluid intake has been restricted. Medical officers in the tropics have two great responsibilities in this matter, first to familiarize themselves with the effects of heat and inadequate fluid intake, and second to insist that an ample water supply is a primary need in hot countries.] *Charles Wilcocks.*

BUSS, O. Dauerschaden durch Hitzschlag. [**Permanent Damage from Heat Stroke.**] *Münch. med. Woch.* 1943. June 4, v. 90, No. 22/23, 356.

A soldier, aged 28, was examined by the author in March 1942; he complained of heart-pain and shortness of breath. He entered the army in 1936, and in August 1937 had an attack of giddiness and weakness while marching in hot weather. Heatstroke was diagnosed and he remained in hospital for several weeks and on his discharge from hospital he was ordered not to do marches or physical exercises. He afterwards did various kinds of work but was always unable to do heavy work. From the history and physical examination the author diagnosed mitral insufficiency resulting from the heat-stroke in 1937. He refers to a case reported in 1942 by TENNER [this *Bulletin*, 1943, v. 40, 94]. *J. F. Corson.*

BOOK REVIEW.

LANE, J. & CERQUEIRA, N. L. **Os Sabetíneos da América (Diptera, Culicidae).** [The Sabethines of America.] *Arquivos de Zoologia do Estado de São Paulo.* 1942, v. 3, Art. IX, 473–849, 451 figs.

Jungle yellow fever, a form of yellow fever that differs epidemiologically from the ordinary classical form of the disease, was first noticed in 1932 in Brazil and reported by SOPER, PENNA, CARDOSO SERAFIM, FROBISHER & PINHEIRO in 1933 [this *Bulletin*, 1934, v. 31, 77]. The classical form of the disease is transmitted from man to man by the bite of *Aëdes* (*Stegomyia*) *aegypti* Linnaeus, a tropicopolitan mosquito of domestic habits breeding in collections of water accumulated deliberately or accidentally around the dwellings of man ; jungle yellow fever occurred in the absence of this mosquito.

The search for the vector of this new form of the disease was begun at once. The outbreaks of jungle yellow fever occurred in rural localities in forest areas and the disease appeared to be contracted only during contact with the forest. Conditions pointed to the animals of the forest as a reservoir of the virus, from which it periodically escaped into human communities through the agency of some forest mosquito. Eventually, in 1938, SHANNON, WHITMAN & FRANCA [this *Bulletin*, 1939, v. 36, 27] reported the successful transmission of the virus to monkeys by two mosquitoes, *Aëdes* (*Finlaya*) *leucocelaenus* D. & S. and *Haemagogus capricorni* Lutz. Furthermore they report that they had detected the presence of the virus in a number of mosquitoes belonging to the group known as the sabethine mosquitoes.

Knowledge of these sabethine mosquitoes was somewhat sparse and scattered. The need to systematize it was obvious and it is appropriate that the work entailed in revising our knowledge of them should have been carried out by two workers in South America and satisfactory that it should have resulted in the book now under review.

The book is primarily a systematic monograph but notes on the habits of the species dealt with are included. The textual part of the monograph occupies 219 pages of letterpress and a further 76 pages are occupied by 451 separate figures, the legends of the figures, the index, etc., occupying the remaining pages. The letterpress is well laid out. The majority of the figures are good line drawings showing morphological details of the genitalia of the adult male (313 figs.) and details of the fourth stage larvae (86 figs.). The remaining figures are half-tone reproductions of photographs of wings (4 figs.) and of photomicrographs of pupal exuviae (48 figs.). Keys to the adults (sometimes restricted to the female), the males (based on the characteristics of the genitalia), the pupae and the larvae (fourth stage) are provided. Synonymies are given in detail. There is an alphabetical index to the generic, sub-generic and specific names.

The authors follow DYAR [this *Bulletin*, 1929, v. 26, 514] and SHANNON [this *Bulletin*, 1932, v. 29, 135] in regarding the sabethine mosquitoes as constituting a tribe, *Sabethini*, of equivalent taxonomic rank to the *Anophelini* and the *Culicini* and they thus differ from EDWARDS [this *Bulletin*, 1933, v. 30, 915] who regarded them as forming a group, without any taxonomic rank, within the tribe *Culicini*.

EDWARDS (*op. c.*) catalogued 109 species of sabethine mosquitoes from the New World and indicated that something was known of the early stages of 51 of these species. There is no recorded overlap of the

New and Old World genera. Lane & Cerqueira, in the work under review, include 150 New World species (and one variety) of which 32 are described as new. They deal with the males of 122 species, the females of 147, the pupae of 53 and the larvae of 89 species. Some of the species described are not known, as adults, in the wild state, and the imagines described are reared specimens. The two authors have carried out a lot of rearing work and, as the above figures show, have considerably increased our knowledge of the New World species.

Lane & Cerqueira distribute the species of American Sabethine mosquitoes amongst five genera, three of which they sub-divided into sub-genera. These are *Trichoprosopon* (with sub-genera *Trichoprosopon, Limamyia* (sg. n.), *Vonplessenia* (sg. n.), *Shannoniana* (sg. n.), *Isogoeldia, Ctenogoeldia* and *Hyloconops*) ; *Wyeomyia* (with sub-genera *Wyeomyia, Nunezia, Cruzmyia* (sg. n.), *Menolepis, Antunesmyia* (sg. n.) and *Dendromyia*) ; *Phoniomyia* ; *Limatus* ; *Sabethes* (with sub-genera *Sabethes, Sabethoides* and *Sabethinus*).

The authors take care to list (on page 688) the new sub-genera they have erected and the new species they have described. They would have earned additional gratitude from those interested in questions of nomenclature if they had listed, or even merely indicated with some symbol, such new synonymy as they have proposed. A systematic catalogue of the valid species would also have been a useful addition and not at all out of place in a work as comprehensive as the present one.

The notes on distribution are copious and its appears that the extent of these is due to the fact that the two authors had access to collections, totalling some 260,000 specimens of sabethine mosquitoes taken by the Serviço de Febre Amarela and the Serviço de Estudos e Pesquisas sobre a Febre Amarela organized by R. C. Shannon.

The authors state that the book is based on work carried out under the auspices of the Serviço de Estudos e Pesquisas sobre a Febre Amarela of the Brazilian Ministry of Education and Health in co-operation with the International Health Division of the Rockefeller Foundation and the Institute of Hygiene of the University of São Paulo. It should serve to provide investigators of jungle yellow fever, and others interested in the sabethine mosquitoes, with a satisfactory means of making trustworthy identifications.

The holotypes and allotypes of the new species described are to be deposited in the Instituto Oswaldo Cruz, Rio de Janeiro. Paratypes are to be deposited, as available, in the entomological collection of the Serviço de Estudos e Pesquisas sobre a Febre Amarela ; in the parasitological collection of the Institute of Hygiene, University, São Paulo ; in the United States National Museum, Washington, D.C. ; and in the British Museum (Natural History), London, in that order of preference.

John Smart.

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ALPHABETICAL LIST OF AUTHORS OR SOURCES.

Adler, S. & Tchernomoretz, J., 103.
Aitken, G. J., 95.
Annegers, J. H., Snapp, F. E., Paskind, L., Ivy, A. C. & Atkinson, A. J., 98.

Baranger, P. & Thomas, P. E., 103.
Basombrio, G., 136.
Beach, W. V., 154.
Berk, L. & Bull, G. M., 145.
Bernsdorf, W., 119.
Bhaduri, N. V., 143.
Bol. Oficina Sanitaria Panamericana, 102.
Boyd, M. F. & Russell, J. C., 92.
von Brand, T., Rees, C. W., Jacobs, L. & Reardon, L. V., 183.
Briceño Rossi, A. L., 151.
Brock, J. F., 142.
Bruce, C. O., Knigin, T. D., Yolles, S. F. & Graham, A. E., Jr., 93.
Buss, O., 154.

Christie, J. R., *et al.*, 139.
Cochrane, E. & Newbold, C. E., 102.
Coggeshall, L. T., 94.
Collignon, E., 101.
Cullinan, E. R. & Whittaker, S. R. F., 126.
Curd, F. H. S., 101.

Das, B. K., 89.
Das Gupta, B. M. & Siddons, L. B., 99.
Das Gupta, C. R., 92.
Dao, L., 96.
Ding, E., 116.
Donaldson, A. W., 141.
Doyle, W. L., 151.

Evans, W., 146.

Faust, E. C., 91.
Fehily, L., 142.
Ferguson, R. L., 127.
Findlay, G. M., 105.
—— & Cockburn, T. A., 122.
da Fonseca, J. A. B. & da Fonseca, F., 93.
Fox, J. P., Kossobudzki, S. L. & da Cunha, J. F., 123.
—— & Penna, H. A., 125.
Francis, J., 136.
Fróes, H. P., 125.

Gaase, 114.
Gaehtgens, W., 138.
Gambia, 106.
Garland, L. H., 147.
Garzon, R. & Pitt, L. A., 135.
Gelfand, M. & Osburn, H. S., 137.
Giraud, P. & Revol, P., 109.

Hoare, C. A., 150.
Hompesch, H., 137.
Hood, M., 132.
Hornby, H. E. & French, M. H., 107.

Ivanhoe, G. L., 132.

Johnson, C. E., Jr., 100.
J. Amer. Med. Ass., 96.

Kean, B. H., 149.
Kirk, R., 121.
Krause, G. R. & Crilly, J. A., 139.
Kumm, H. W. & Crawford, P. J., 123.

Ladell, W. S. S., 153.
Laemmert, H. W., Jr. & Moussatché, H., 123.
Lane, J. & Cerqueira, N. L., 155.
Lesh, J. I. & Cannon, D. A., 134.
Lever, R. J. A. W., 150.
Longinov, A. N., 140.
Lopez Soriano P., 118.
Lozner, E. L. & Newhouser, L. R., 91.

McConn, C. F., 111.
McNamara, K. N., 140.
MacNaught, W. W. & Murray-Lyon, R. M., 148.
Mann, W. N., 100.
Mazza, S. & Chacon, R. V., 108.
Mazzotti, L., 134.
Meyer, R., 115 *bis*.
Morgan, A. A. & Squires, B. T., 147.
Morse, E. M. & Seaton, S. P., 133.

Napier, L. E. & Sen Gupta, P. C., 143.
Nesterwodskaja, K. M. & Lubinski, G. A., 102.

Packchanian, A., 107.
Pardo-Castello, V. & Tiant, F. R., 135.
Patel, J. C., 118.
Pavlovsky, E. N., 129.
Pesce, H. & Pardo, L., 110.

Reimer, K., 120.
Rey, H., 110.
Robertson, F., 106.
Roy, A. N. & Mukerjee, S., 103.
Royo Montañés, M., 133.
Rubinstein, A. D. & Rowley, H. F., 119.
Rumball, C. A., Parsons-Smith, B. G. & Nancekievill, L., 95.
Russell, P. F., Badri Nath Mohan & Putnam, P., 104.

Schulten, H. & Broglie, 127.
Schwetz, J., 90.
Sekar, C. C., 143.
Sen Gupta, P. C., 144.
Skuja, N., 121.
Sokhey, S. S. & Habbu, M. K., 129 *bis*.
Squires, B. T., 147.
Steuer, W., 113.
Stuart-Harris, C. H., Rettie, G. K. C. & Oliver, J. C., 111.
Sylla, A., 128.

Talbot, D. R., 97.
Turner, E. L., Bent, M. J., Holloway, G. D., Cuff, J. R. & Quinland, W. S., 148.

Vail, D., 151.
van der Meer, G. & Brug, S. L., 152.
Vaucel, M. & Campourcy, A., 94.
Villarino Ulloa, R., 149.

Wenderoth, H., 130.
Wilke, G., 131.
Wilson, D. B. & Notley, F. B., 90.
Wolfson, F., 104.
Wood, S. F., 108.
Wright, C. I. & Lillie, R. D., 99.

Yao, Y. T., 88.
Young, M. R., 141.
Yu, N. G. & Ying, Y. Y., 89, 95.

Zain, H. & Wolf, A., 104.

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